

No. 6.— *Further Studies on North American Lithobiidae.*

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THE present paper, written in 1914, consists of revisions of new or recently described genera of Lithobiidae as represented in America, north of Mexico.

All of the material upon which this paper is based was collected by the author, unless specifically stated to the contrary.

The key will aid in the separation of the genera.

Key to the Genera.

- a. No ocelli present. *Typhlobius*, gen. nov.
- aa. Ocelli present.
 - b. Prosternal teeth 5+5 or more.
Posterior angles of none of the dorsal plates produced; articles of antennae more than 25. *Sozibius* Chamberlin.
 - bb. Prosternal teeth normally 2+2, or occasionally up to 4+4.
 - c. Fourth joint in anal leg of male with a lobe at proximal end bearing a dense brush of very long hairs.
Posterior angles of none of dorsal plates produced; articles of antennae about 24. *Pampibius*, gen. nov.
 - cc. Fourth joint of anal legs of male not thus modified.
 - d. Articles of antennae 26 or more. (Posterior angles of ninth, eleventh, and thirteenth dorsal plates, or of seventh, or of sixth and seventh in addition, produced).
 - e. Line of apices of prosternal teeth more or less procurved, the inner tooth of each pair being the larger; basal spines of gonopods of female slender.
Paitobius Chamberlin.
 - ee. Line of apices of prosternal teeth recurved; basal spines of gonopods of female short and very broad.
Taiyubius Chamberlin.
 - dd. Articles of antennae normally 20, rarely as many as 24 (but when so none of dorsal plates with posterior angles produced).
 - e. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced; neither anal nor penult legs of male with any special process or lobe; anal legs with two or three claws. . . *Sonibius* Chamberlin.

- cc. Posterior angles of none of dorsal plates produced or, rarely, those of eleventh and thirteenth, or of ninth, eleventh, and thirteenth weakly produced, but, when so, claw of anal leg single; with few exceptions, either anal or penult legs in male with special lobes or ridges,
- f. Fifth joint of anal leg of male always bearing on dorsal surface at distal end a conspicuous crest.

Nadabius Chamberlin.

- ff. Fifth joint of anal legs of male with no such crest.
- g. Penult legs of male bearing a conspicuous lobe at distal end of fifth article, but anal legs without special process. *Simobius*, gen. nov.
- gg. Penult legs of male bearing no such lobe, or if so the anal legs also strongly modified; the third and fourth joints of the latter nearly always longitudinally ridged and produced into lobes, rarely not modified. *Pokabius* Chamberlin.

SOZIBIUS Chamberlin.

Ann. Ent. soc. Amer., 1912, 5, p. 152.

Head with lateral marginal interruptions distinct.

Antennae moderate in length or short; composed of from twenty-five to thirty-five articles.

Eye composed of seriate ocelli; a single ocellus usually moderately enlarged, but sometimes subequal to caudal ocellus of upper series.

Prosternal teeth 5+5 to 7+7; spines slender, distally bristle-like.

Posterior corners of ninth, eleventh, and thirteenth dorsal plates straight or somewhat excised, or those of thirteenth, or of eleventh and thirteenth, weakly produced.

Coxal pores circular uniseriate.

Gonopods of male uniarticulate.

Claw of genital forceps of female large; either entire or with one or two relatively small lateral teeth situated well proximad. Spines 2+2; moderately long and slender, mostly more or less acuminate from base. First article of forceps not excavated proximally.

Tarsi of all legs divided.

In the anal legs of the male the fourth joint is more or less thickened, especially distally and is dorsally longitudinally furrowed and typically concave or saddle-shaped; at distal end more or less elevated dorsad (Plate 1, fig. 1, 6).

Last one or two pairs of coxae laterally armed. Third joint of all legs caudad of first to sixth pairs with three dorsal spines, the others with two. Fifth joint of all legs between third and eleventh pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 1, 3, 3, 2; the claw single. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claw single. Dorsal spines of twelfth legs, 1, 0, 3, 1, 1 or 0, 0, 3, 1, 1; ventral, 0, 0, 3, 3, 2. Dorsal spines of first legs mostly 2, 1, 1, occasionally 1, 1, 1 or 2, 2, 1; ventral 2, 2, 1 to 2, 3, 2.

Length 8-14 mm.

TYPE.—*S. tuobukus* (Chamberlin).

This interesting genus, at present known from three species, has a rather restricted distribution (Fig. 1). It is very common in North Carolina, Tennessee, and Virginia, especially, it would seem, in the mountainous sections. This region appears to be the center of distribution. It is known from as far north as Philadelphia and as far west as Arkansas.

Key to Species of Sozibius.

- a. Dorsal spines of second legs 0, 0, 3, 2, 1; ventral spines of first legs in adults nearly always 0, 0, 2, 3, 2; claw of ♀ gonopods strictly entire. *S. providens* (Bollman).
- aa. Third joint of first three to six pairs of legs with but 2 dorsal spines, the formula of the second pair being 0, 0, 2, 2, 1; ventral spines of first legs 0, 0, 2, 2, 1; claw of ♀ gonopods either bipartite or tripartite.
 - b. Last pair of coxae alone laterally armed; first five or six pairs of legs with third joint bearing but 2 dorsal spines.
 - S. pennsylvanicus*, sp. nov.
 - bb. Last two pairs of coxae laterally armed; only the first three or four pairs of legs with but 2 dorsal spines on third joint.
 - S. tuobukus* (Chamberlin).

SOZIBIUS TUOBUKUS (Chamberlin).

Plate 1, fig. 6; Plate 2, fig. 1, 2.

Lithobius tuobukus Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 36.

Sozibius tuobukus Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 152.

DESCRIPTION.—Dorsum light brown or testaceous, often of a more or less orange cast, the posterior plates commonly in some degree

FIG. 1.—Distribution of *Sozibius*.

darker. Head either the same in color as the dorsum or, more typically, a darker brown with the frontal region paler, somewhat orange or ferruginous; the first dorsal plate commonly agreeing in color with the posterior portion of head. Antennae light yellowish brown proximally, yellow distad. Venter pale brown or brownish yellow with the caudal plates darker. Prosternum and prehensors somewhat orange-brown to very dilute chestnut. Legs pale brownish yellow, the caudal pairs bright yellow, especially distad.

Body moderately narrowed cephalad to the first dorsal plate, the widths of head and of the first, third, eighth, tenth, and twelfth plates being to each other as 64 : 58 : 60 : 69 : 72 : 67.

Head from equal in length and breadth to wider than long in ratio 20 : 19 or less, the head in the ♂ appearing to be wider on the average than in the ♀. Widest just caudad of eyes, rather conspicuously narrowed cephalad; caudal margin mesally slightly incurved. Marginal interruptions very slight, sometimes essentially obsolete.

Antennae commonly reaching to the seventh segment but sometimes considerably shorter and not surpassing the fifth. Articles twenty-five to thirty of intermediate length; the ultimate usually distinctly shorter than the two preceding taken together, distally pointed.

Ocelli from nine to eighteen, usually in four series, sometimes in three: *e.g.*, 1 + 5, 3, 2; 1 + 4, 5, 4; 1 + 3, 3, 2; 1 + 4, 5, 4, 2; 1 + 5, 4, 4, 3; 1 + 5, 4, 3, 2; 1 + 2, 5, 5, 3; 1 + 6, 5, 4, 1. Single ocellus usually only a little, or sometimes not at all, larger than the most caudal ocellus of the dorsal series, the corresponding one of the second series also often large; mostly vertically subelliptic, but sometimes circular and sometimes angular. The seriate ocelli vary, often irregularly, in an unusual degree in size, form, and arrangement, with the series frequently very irregular.

Prosternum 1.6–1.7, mostly near $1\frac{2}{3}$, times wider than long. Distance between the chitinous spots $1.87 + 2$ times the width at level of bottom of median incision; 2.5 to 2.7 times the dental line. Teeth 5 + 5 or 6 + 6, rather small, uniform, the line of apices forming a distinctly reentrant angle. Spine slenderly acuminate, bristle-like, and straight or nearly so. Incision distinctly u-shaped or with the bottom sometimes somewhat angular.

First dorsal plate with the sides weakly convex, moderately converging caudad to the widely rounded caudal corners; caudal margin mesally incurved; plate 1.6+ times wider than long. Caudal margin of the ninth plate straight all the way across. Eleventh plate with

the posterior corners showing tendency toward weak production, while the corners of the thirteenth plate are more distinctly, but still only slightly, produced.

Coxal pores circular: 3, 4, 4, 3; 3, 4, 5, 4; 4, 5, 5, 4; 4, 6, 6, 4; 5, 6, 6, 5.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 2, 2, 1}$ or $\frac{0, 0, 2, 1, 1}{0, 0, 2, 2, 1}$; of the second, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 2, 1}$ and $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 1}$ to $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$ or, occasionally, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 1}$; of the fourth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the fourth to the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1(0), 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1(0), 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or sometimes, on one side, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, the claw single; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$ or occasionally, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, or the spine of trochanter rarely missing. Last two pairs of coxae normally armed, rarely only the anal.

Anal legs of the male with the third article thickened into a rounded longitudinal ridge which is subdensely clothed with long bristles. Fourth article elevated into a rounded prominence at proximal end, this being clothed like the ridge of the preceding joint; caudad of this elevation the joint is longitudinally excavated or furrowed, with a ridge-like elevation on each side, the mesodorsal one of which increases in height, and in the number of hairs borne, proximad, while the ectodorsal one increases in similar manner distad and terminates in an elevation at distal end of joint which is often conspicuous and which bears the dorsal spine, the latter frequently projecting directly caudad (Plate 1, fig. 6). Penult legs more slender but they may be similarly though more weakly modified.

Gonopods of male small but distinctly exposed; oblique.

Claw of female gonopods large, long, well curved, and very acutely pointed; bipartite, the main lobe bearing the second near the middle of its length on the outer or ventral edge as a very small denticle, or tridentate, a denticle appearing at nearly the same level on the outer edge (Plate 2, fig. 1). Basal spines 2 + 2; the outer one of each pair only a little or not at all longer than the inner; in ventral view moderately narrowing from base to near middle and then of uniform width to the beginning of the acuminate division which is long and acute; outer edge often denticulate (Plate 2, fig. 2).

Length 9 to 13 mm.

Early pseudomaturus.—Body yellow or brownish yellow. Head and prosternum darker, orange. Legs yellow, the posterior pairs brightest.

Antennae consisting of twenty-six articles which distad of the third are very short and closely united. Ultimate article much longer than the two preceding taken together.

Ocelli $1 + 3, 2$. Single ocellus and first two of the upper series subequal in size; the two ocelli of the ventral series much smaller. Single ocellus not distinctly separated or otherwise differentiated.

Prosternum of same form and structure as in *maturus*. Teeth $5 + 5$, on each side decreasing mesad and the most mesal one considerably reduced.

Coxal pores very small: 2, 3, 3, 3.

Claw of female gonopods proportionately shorter than in the *maturus*, with the lateral tooth or teeth occasionally only vaguely indicated. Spines $2 + 2$, more attenuated distad than in *maturus* and the inner spine proportionately shorter.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 2, 2, 1}$; of the second and third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$; of the fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$; of the fifth, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$; of the sixth to eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the remaining pairs as in the *maturus*. Last two pairs of coxae similarly laterally armed.

Length near 7.5 mm.

Specimens described, collected at Johnson City, Tenn., in August, 1910, are nearly between usual *praematurus* and *pseudomaturus* stages.

Immaturus.—Coloration as in preceding form.

Articles of antennae twenty-four. (Regenerating antenna on one side has but fifteen).

Ocelli $1 + 2, 2$; $1 + 2, 3$. First ocellus of upper series larger than the single ocellus. All contiguous.

Prosternum with teeth $5 + 5$, the most mesal on each side being very small. Incision, spines, and general structure as in the older stages.

Coxal pores very small: 2, 3, 3, 2; 2, 3, 3, 3.

In the gonopods of the female the three articles are present. Third article with claw indicated as a small, pale, acute point. Second article with one bristle, the first with three. Spines $1 + 1$, minute, acute, pale.

Spines of first legs, $\frac{0, 0, 0, 1, 1}{0, 0, 1, 1, 1}$; of the second, $\frac{0, 0, 0, 1, 1}{0, 0, 1, 1, 1}$ or $\frac{0, 0, 0, 2, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 0, 2, 1}{0, 0, 1, 1, 1}$; of the fourth to seventh, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$; of the eighth to tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 2, 1}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 1, 2, 1, 1}$ (right side) or $\frac{1, 0, 2, 1, 1}{0, 1, 2, 2, 2}$ (left side); penult and anal legs missing from specimen described. Last three pairs of coxae dorsally armed, but no lateral spines detected on any.

Length near 6.7 mm. (Johnson City, Tenn., August, 1910).

Agenitalis I.—Pale, very dilute yellowish, throughout.

Antennae very short; articles twenty.

Ocelli $1 + 2, 1$, also in one case $1 + 3, 2$ (South Carolina). First

ocellus of upper series largest, the single one being next in size, while the other two are much smaller.

Prosternal teeth 4 + 4.

Coxal pores very small: 1, 1, 1, 1.

Anal glands fully developed and very distinct.

Spines of the first legs, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 0, 1}$; of the second, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 1, 1}$; of the third, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 1, 1}$ or $\frac{0, 0, 0, 1, 1}{0, 0, 0, 1, 1}$; of the fourth to seventh, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 1, 1}$; of the ninth, $\frac{0, 0, 0, 1, 1}{0, 0, 1, 1, 1}$, the two dorsal spines being on the anterior side; of the tenth, $\frac{0, 0, 1, 1, 1}{0, 0, 1, 1, 1}$, the dorsal spine of fourth joint being caudal and that of fifth joint anterior in position; of the eleventh to thirteenth, $\frac{0, 0, 0, 0, 0}{0, 0, 1, 1, 1}$; others wanting. None of the coxae armed dorsally or laterally.

Length near 5 mm. (Johnson City, Tenn., August, 1910).

TYPE LOCALITY.—North Carolina: Hot Springs.

Also taken in North Carolina: Linnville Falls, Brown's Summit. South Carolina: Greenville. Tennessee: Johnson City, Unaka Springs. Virginia: Chatham, Lynchburg, Natural Bridge. West Virginia: White Sulphur. Kentucky: Lexington.

The specimens recorded by Bollman from Washington, D. C., as *L. providens* probably belong to the present species.

SOZIBIUS PENNSYLVANICUS, sp. nov.

Plate 1, fig. 1-5.

DESCRIPTION.—From light brown to chestnut, the normal color in specimens in full color, the species being darker than the other two known. Head and, usually, the first dorsal plate darker, the head having a dusky or black area or spot caudad of the suture in front of which it is light ferruginous or orange. Antennae brown proximally, yellowish distally. Venter but little paler than the dorsum, darkest caudally as usual. Prosternum and prehensors typically dark brown to dilute chestnut, the prehensors paler distad. Legs brownish yellow or brown, the posterior pairs more brightly colored, commonly bright yellow, especially distally and ventrally.

Body strongly narrowed cephalad, the widths of head and of first, eighth, tenth, and twelfth plates being to each other as 56 : 52 : 56 : 64 : 66 : 60.

Head equal in length and breadth strongly narrowed cephalad. Marginal breaks very small as in related species.

Antennae short, reaching fifth to seventh segments. Articles nearly always twenty-seven or twenty-eight, mostly the latter; short and very short and usually closely compacted. Ultimate article of moderate length.

Ocelli nine to fifteen, usually in three but also often in four series: *e.g.*, 1 + 5, 4, 3; 1 + 5, 6, 4; 1 + 4, 4, 3; 1 + 3, 3, 2; 1 + 4, 3, 3, 1; 1 + 5, 4, 3, 2. Single ocellus somewhat largest or equal to or smaller than first of upper series and scarcely differentiated. Ocelli varying much in relative and absolute size and in arrangement. Organs of Tömösvary in outline usually clearly larger than any ocellus (Plate 1, fig. 2, 3).

Prosternum with median incision small, u-shaped. Teeth mostly 5 + 5, apically rounded, on each side somewhat decreasing mesad. Spine slender, only a little curved, inserted close to the ectal tooth as usual. 1.73–1.76+ times wider than long. Distance between chitinous spots 2+ times width at level of bottom of incision; 2.75 times the dental line.

First dorsal plate 1.75+ or more times wider than long; widest cephalad but only weakly narrowed caudad to the rounded corners. Posterior corners of the ninth, eleventh, and thirteenth dorsal plates with caudal side straight or slightly rounded, in some a little obliquely excised on one side, not at all produced or rarely showing a very vague tendency toward production.

Coxal pores: 2, 3, 3, 2; 3, 3, 3, 3; 3, 3, 3, 2; 2, 3, 3, 3; 3, 4, 4, 4.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$; of the fourth to sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$, or of sixth sometimes $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the seventh to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$. Only the last pair of coxae laterally armed.

Fourth joint of the anal legs in the male moderately thickened; the dorsal surface bowed in concavely between the ends and longitudinally shallowly furrowed; elevated at distal end; hairs straight, sparse, much fewer than in *providens* and *tuobukus* (Plate 1, fig. 1).

Claw of female gonopods large; only moderately curved; subacute; always with a distinct small lobe or tooth on the outer or ventral edge a little distad of middle of length and there may also be a smaller denticle on the dorsal edge farther distad (Plate 1, fig. 4). Spines 2 + 2; outer one of each pair a little longer than the mesal one; in ventral view both spines appear distinctly and uniformly acuminate from base to apex with the sides appearing smooth or the ectal edge of inner spine showing denticulations, but these commonly bent dorsad and not always evident in ventral view (Plate 1, fig. 5).

Length 8 to 10 mm., this species averaging considerably less in size than either of the other two species.

Praematurus.—(Male.) Yellow throughout. Head caudad of su-

ture darker, dusky yellow; frontal region dilute orange. Prosternum dusky yellow, prehensors distally a brighter yellow. Legs yellow.

Antennae composed of twenty articles which are short and closely united.

Ocelli 1 + 3, 3; 1 + 3, 2. Single ocellus smaller than the first one of the upper series which is much larger than the other seriate ocelli.

Prosternum with incision, spines, and general structure as in *maturus* stage. Teeth 5 + 5.

Coxal pores very small; 2, 3, 3, 2.

Spines of first legs, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 0, 1, 1}{0, 0, 1, 1, 1}$ or $\frac{0, 0, 1, 1, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 1, 2, 1}{0, 0, 1, 1, 1}$ to $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fifth to eleventh $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the twelfth, $\frac{1, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$.

Anal leg of male with the fourth joint but little modified, the dorsal surface being slightly bowed and a little elevated distad.

Length 7 mm.

Pullus II (*Larva secunda*).—Body and legs essentially without pigment; the head, prosternum, and antennae with a very dilute yellowish tinge.

Ocelli 1 + 2, 1. First ocellus of upper series largest, the single one next, the other two being much smaller.

Prosternum with median incision relatively wide, semicircular. Teeth 3 + 3.

Eight pairs of developed legs are present, the slender appressed buds of two additional pairs appearing caudad of these. The sixth, seventh, and eighth pairs of legs have a division indicated in their tarsi while the tarsi of the more anterior pairs appear entire.

Spines of first to seventh pairs of legs, $\frac{0, 0, 0, 0, 1}{0, 0, 0, 1, 1}$; of the eighth, $\frac{0, 0, 0, 0, 0}{0, 0, 1, 1, 1}$. Ventral spine of tibia relatively long and stout, much exceeding the others in size. Ventral spine of third joint, when present, small. Dorsal spine of tibia slender and almost bristle-like. Hairs relatively long.

Length near 3.5 mm.

TYPE.—M. C. Z., No. 94, Pennsylvania: Upsal, October 20, 1912. Many specimens.

SOZIBIUS PROVIDENS (Bollman).

Plate 2, fig. 3-6.

Lithobius providens Bollman, Amer. nat., 1887, 21, p. 81. Proc. U. S. N. M., 1887, 10, p. 258. Bull. 46, U. S. N. M., 1893, p. 19, 24, 79, 82, 85, 92, 100, 110, 133.

DESCRIPTION.—Dorsum light brown to yellowish. Head darker, light chestnut, with the frontal region paler, often ferruginous. Antennae brown or brownish yellow proximally, paler distally. Venter brown to yellow of paler cast than dorsum; the posterior plates darker as usual. Prosternum and prehensors light chestnut of nearly same shade as head. Legs like corresponding plates of venter excepting that the caudal pairs may be lighter, sometimes being bright yellow, especially ventrally and distally.

Body robust, 7 to 7.5 times longer than width of tenth plate. Body considerably narrowing cephalad to the first dorsal plate, which is decidedly narrower than the third, the widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 65 : 58 : 62 : 75 : 76 : 70.

Head precisely equal in length and breadth, or very nearly so. Widest just caudad of eyes, from these narrowing gradually and but little to the rounded caudal corners. Posterior margin mesally incurved. Lateral marginal breaks small but usually distinct.

Antennae usually reaching the sixth segment but sometimes longer and attaining the eighth. Slender distally. Articles twenty-eight to thirty-five; mostly short; rather loosely joined; ultimate long and slender, usually a little longer than the two preceding ones taken together.

Ocelli nine to fifteen in four series or, less commonly, in three: *e. g.*, 1 + 3, 3, 3; 1 + 2, 3, 2, 1; 1 + 3, 3, 3, 2; 1 + 3, 4, 4, 3; 1 + 4, 4, 4, 2; 1 + 4, 3, 3, 1, and 1 + 4, 3, 3, 2, the two last seeming to be the commonest arrangements. Single ocellus commonly largest but sometimes equal to or smaller than the first of the most dorsal series. Seriate ocelli varying considerably in relative and absolute size in different specimens and also in form, being sometimes angular or elongate rather than circular.

Prosternum with teeth acute, uniform, moderate; decreasing somewhat in size from most ectal to most mesal on each side; line of apices on each side a little convex, as a whole forming a reentrant angle; teeth in number 5 + 5 to 7 + 7. Median incision narrowly u-shaped, often narrower at mouth than at bottom. Spine straight, slenderly acuminate and bristle-like, inserted near ectal tooth. $1\frac{2}{3}$ to 1.7 times wider than long. Distance between chitinous spots 1.85–1.88 times width at level of bottom of mesal incision; 2.75–2.88+ times the dental line (Plate 2, fig. 3).

First dorsal plate 1.6+ times wider than long. Considerably narrowed caudad, with the sides convex. Ninth plate with the

caudal margin straight, or one corner may be obliquely excised. Caudal corners of eleventh and thirteenth plates slightly produced, those of the thirteenth the more distinctly so.

Coxal pores: 3, 4, 4, 3; 4, 4, 4, 3; 4, 5, 4, 3; 4, 4, 5, 4; 4, 5, 5, 4; 4, 5, 5, 3; 5, 6, 6, 4; etc.

Spines of first legs usually, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$, sometimes, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$ in specimens toward *pseudomaturus* stage; of the second and third, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the fourth to tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$. Last two pairs of coxae, laterally armed.

As in *tuobukus*, the fourth joint of the anal legs in the male is typically conspicuously thickened, more strongly so distad than proximad, and is elevated dorsad at the distal end; cephalad of this rounded dorsal elevation the joint is longitudinally depressed and furrowed; the bulge or ridge along mesodorsal surface mesad of the furrow clothed subdensely, especially toward proximal end, with very long bristles. Usually the fifth joint is slender but is somewhat clavately and usually irregularly enlarged distad and may in fact project ventrad in a conspicuous lobe at the distal end. Tibial and tarsal joints longitudinally sulcate along mesal surface. Penult legs slender, with the last three or four joints sulcate longitudinally on caudal (mesal) side.

Claw of female gonopods long, not much curved, scarcely excavated on inner side; comparatively narrow and acutely pointed; strictly entire, there being no trace of lateral teeth.

Basal spines 2 + 2; long and rather slender; acuminate from base to tip which may be very narrowly rounded; in ventral view the edges are either smooth or one or more denticles may appear on the ectal edge of inner spine, or occasionally on outer one, or the edges sometimes finely undulate; if the spines are viewed from side, however, denticles directed dorsad from the edges, which are bent or partly rolled, may be seen. Extremes of variation in form of spines are shown (Plate 2, fig. 5, 6).

Length 11 to 14 mm. A male 14 mm. long has antennae 7+ mm. long; anal legs cir. 4.25 mm. long; and tenth plate 2 mm. wide.

Immaturus.—Light yellow. Head a little darker, of dilute orange tinge. Prosternum and prehensors like head. Venter yellow. Legs light yellow, the posterior pairs brightest.

Antennae composed of twenty-five to twenty-seven articles which are mostly short, sometimes with two shorter ones appearing together at intervals and being, apparently, the result of more recent subdivision

of a preceding single article. Ultimate article long, conically acuminate, distally rounded.

Ocelli 1 + 2, 3. The first ocellus of upper series much larger than the other seriate ocelli and as large as or, more usually, considerably larger than the single ocellus. Organ of Tömösvary relatively large as in the *maturus*.

Prosternum in general proportions and form as in the *maturus*. Median incision u-shaped, with sides more widely divergent than in adult. Teeth 4 + 4 or 5 + 5.

Coxal pores: 2, 3, 3, 2; 3, 3, 3, 3.

The three articles of gonopod of female are present, the claw on the distal one being also represented as a small, acute, chitinous point. Basal spines 1 + 1, these appearing merely as acute chitinous points.

Anal glands absent or obscurely traceable as more or less degenerated remnants.

Spines of first legs, $\frac{0,0,0,1,1}{0,0,1,1,1}$; of the second, $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the third, $\frac{0,0,1,2,1}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$; of the fourth, $\frac{0,0,1,2,2}{0,0,1,1,1}$ or $\frac{0,0,2,2,1}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the fifth, $\frac{0,0,1,2,2}{0,0,1,1,1}$ to $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the sixth, $\frac{0,0,2,2,2}{0,0,1,1,1}$ or $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the seventh and eighth, $\frac{0,0,2,2,2}{0,0,1,1,1}$ or $\frac{0,0,2,2,2}{0,0,2,2,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,1,2}$ or $\frac{0,0,2,2,2}{0,0,2,2,2}$ to $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the tenth, $\frac{0,0,2,2,2}{0,0,1,1,2}$ to $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the eleventh, $\frac{0,0,2,2,2}{0,0,1,2,2}$ or $\frac{0,0,2,2,2}{0,0,2,2,2}$; of the twelfth, $\frac{0,0,2,2,1}{0,0,3,2,2}$ or $\frac{0,0,2,2,1}{0,0,3,3,2}$; of the thirteenth, $\frac{0,0,2,2,1}{0,1,2,2,1}$ to $\frac{0,0,2,2,1}{0,1,3,3,2}$; penult, $\frac{1,0,1,1,0}{0,1,1,2,1}$ or $\frac{1,0,1,1,0}{0,1,1,2,0}$; the coxal spine minute. Either none of the coxae laterally armed or the last pair with a very small lateral spine.

Length 6.5–7.5 mm. (Russellville, Tenn., August, 1910).

Agentialis II.—Light yellow throughout. The head, prosternum, and prehensors a little darker, of an orange cast.

Antennae in specimens studied with twenty-two or twenty-three articles which are short or very short, the shortest ones occurring in pairs at intervals as usual. Ultimate article relatively long, clearly exceeding the two preceding together.

Ocelli 1 + 2, 3; 1 + 2, 2; 1 + 2, 1. The most caudal eye of dorsal series much larger than any other, with the single ocellus next in size. All ocelli pale; well separated.

Incision of prosternum with sides divergent as in preceding stage. Teeth 4 + 4.

Coxal pores: 1, 2, 2, 2; 2, 2, 2, 2; very small.

Gonopods of female apparent as short, biarticulate buds.

Anal glands absent or degenerate.

Spines of first legs, $\frac{0,0,0,0,0}{0,0,0,1,1}$ or $\frac{0,0,0,0,1}{0,0,0,1,1}$; of the second, $\frac{0,0,0,0,1}{0,0,1,1,1}$; of the third, $\frac{0,0,0,1,1}{0,0,1,1,1}$ or $\frac{0,0,0,2,1}{0,0,1,1,1}$; of the fourth to sixth, $\frac{0,0,1,1,1}{0,0,1,1,1}$ or $\frac{0,0,1,1,1}{0,0,1,1,1}$; of the seventh, $\frac{0,0,1,2,1}{0,0,1,1,1}$; of the eighth and ninth, $\frac{0,0,1,2,1}{0,0,1,2,1}$; of the tenth, $\frac{0,0,1,1,1}{0,0,1,2,1}$; of the

eleventh and twelfth, $\frac{0, 0, 1, 1, 0}{0, 0, 1, 1, 1}$; of the thirteenth, $\frac{0, 0, 0, 0, 0}{0, 0, 1, 1, 1}$ or $\frac{0, 0, 1, 0, 0}{0, 0, 1, 1, 1}$; of the penult, $\frac{0, 0, 1, 0, 0}{0, 0, 1, 1, 1}$; of the anal, $\frac{0, 0, 1, 0, 0}{0, 0, 1, 1, 1}$, the trochanter bearing a bristle distally. None of the coxae armed.

Length 5-6 mm. (Russellville, Tenn., August, 1910).

TYPE LOCALITY.—Indiana: Bloomington.

Also taken in Indiana at La Fayette, Richmond, Brookville, Salem, New Providence, Wyandotte. Tennessee: Russellville, Knoxville, Beaver Creek, Mossy Creek. Arkansas: Little Rock.

TYPHLOBIUS, gen. nov.

Head with lateral marginal interruptions only vaguely indicated by a slight obliquity at the point where usually developed.

Antennae short to moderate; composed of twenty to twenty-eight articles.

No ocelli present.

Prosternal teeth 2 + 2; line of apices recurved. Spines slender and bristle-like.

None of the dorsal plates with caudal angles produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods long and slender; bipartite (subentire) or tripartite, the lateral tooth small and situated well proximad. Spines 2 + 2; long and slender, attenuated from base distad.

Tarsi of anterior legs slender; distinctly divided and the distal segment more slender.

Only the last pair of coxae laterally armed. Third joint of first eight to eleven pairs of legs with but two dorsal spines, or the most anterior one to three with but one. Fifth joint of all legs between third and thirteenth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claw single, long. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 2, 1; one accessory claw which is very small or obsolete. Dorsal spines of thirteenth legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of twelfth legs 0, 0, 3, 1, 2; ventral 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 or 0, 0, 2, 2, 1; ventral 0, 0, 2, 2, 1 or 0, 0, 2, 3, 1.

Length 8 to 11 mm.

TYPE.—*T. kebus*, sp. nov.

The two species for which this genus is established are small, much alike in general appearance, and characteristically slender, being 9.5 or 10 times longer than the width of the tenth plate. They are light

FIG. 2.—Distribution of *Typhlobius*.

yellow in color with the head pale orange. Their habits are not known; but the absence of eyes and the weak pigmentation would indicate that they are probably more strongly lucifugous than usual.

Key to Species of Typhlobius.

- a.* Articles of antennae twenty; trochanter of thirteenth legs with a spine; ventral spines of anal legs 0, 1, 3, 2, 1. . *T. kebus*, sp. nov.
- aa.* Articles of antennae twenty-eight; trochanter of thirteenth legs unarmed; ventral spines of anal legs 0, 1, 3, 2, 0.
T. coecus (Bollman).

TYPHLOBIUS COECUS (Bollman).

Plate 3, fig. 7; Plate 4, fig. 1, 2.

Lithobius coecus Bollman, Ann. N. Y. acad. sci., 1888, 4, p. 111. Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 36.

DESCRIPTION.—Dorsum yellow of dilute orange cast. Head more distinctly orange. Antennae light distally, proximally approaching the head in color. Prosternum like head but a shade lighter. Venter a little paler than dorsum, the caudal plates more distinctly orange than the others. Legs yellow, the caudal pairs most densely pigmented.

Body slender, usually ten times longer than width of tenth plate or a little less. Head as wide as, or wider than, the tenth plate and the third plate narrower than the first. Widths of head and of first, third, eighth, and tenth plates in a female measured as 25 : 22 : 21 : 23 : 24 : 23; in a male as 28.5 : 26 : 24 : 27 : 27 : 25.

Head cordate, conspicuously narrowed from caudal edge of eyes cephalad. Equal in length and breadth.

Antennae of moderate length; strongly attenuated distad. Articles mostly twenty-eight which are short and often submoniliform. Bristles long and subdense.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.25 times width at level of bottom of mesal incision; four times length of the dental line. Median incision v-shaped, its sides from moderately concave to nearly straight. Teeth moderate in size, the mesal one of each pair a little larger than the outer, acute; line of apices a little recurved. Spine inserted at base of outer tooth, small and slender.

First dorsal plate about 1.65 times wider than long. Caudal margin of ninth, eleventh, and thirteenth plates a little curved forwards at ends, the corners being rounded.

Coxal pores small, the most proximal ones often much reduced: 3, 3, 3, 3; 2, 3, 4, 3.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 2, 2, 1}$; of the second, $\frac{0, 0, 1, 2, 1}{0, 0, 2, 3, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 1}$; of the fourth and fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 1}$; of the sixth to eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the ninth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 2, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$. Last pair of coxae laterally armed.

Posterior legs of male short. Penult laterally somewhat compressed, distinctly longitudinally sulcate on the caudal, or mesal, side; fourth joint raised along dorsal surface into a ridge which is elevated at distal end.

Claw of female gonopods long and acute, with a single small acute tooth near base on outer or ventral edge. Spines 2 + 2; long, the outer larger than the inner; slender, attenuated from base to tip.

Length 8.5 to 11 mm.

TYPE LOCALITY.—Tennessee: Beaver Creek. Also taken in North Carolina at Saluda.

In Bollman's description of the type the following differences may be noted: ventral spines of anal legs 0, 1, 3, 1, 0 and of the penult 0, 1, 3, 2, 0, a spine probably having been overlooked on fourth joint of the anal and on fifth of the penult.

TYPHLOBIUS KEBUS, sp. nov.

Plate 3, fig. 5, 6.

DESCRIPTION.—Dorsum very dilute yellow, the pigment a little denser on the first one and the several most caudal plates. Head light orange-yellow. Antennae yellowish proximally, whitish distally. Prosternum like head but a little paler. Venter similar to dorsum, the caudal plates, as usual, more densely pigmented. Legs with faint yellow tinge.

Body very nearly 9.5 times longer than width of tenth plate, being very slender and appearing almost parallel-sided, with the head wider than any dorsal plate and the first plate wider than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 30 : 27 : 26 : 26 : 27 : 26.

Head nearly equal in length and breadth, being slightly wider.

Widest a little in front of marginal breaks and strongly narrowed cephalad. Hairs long, very sparse.

Antennae short, attaining the fifth segment. Distal portion unusually slender. Articles twenty, moderately short, the distal ones slender and almost strictly cylindric. Ultimate article very long.

Organ of Tömösvary in usual position; not enlarged.

Prosternum with median incision very narrow and relatively deep, its sides straight. Teeth moderately large and well chitinized; inner tooth of each pair distinctly larger than the outer; line of apices recurved; ectal side of outer tooth nearly parallel with longitudinal axis while the inner edge is very oblique, the reverse being true of the inner tooth (Plate 3, fig. 5). Spine small and bristle-like, straight. Prosternum 1.52 times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of mesal incision; 3.8 times as great as length of dental line.

First dorsal plate 1.8 times wider than long; sides moderately convex and diverging cephalad. Minor plates with caudal corners subrectangular or simply rounded. Plates very sparsely clothed with short hairs, and along margins, with some longer hairs.

Coxal pores very small: 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the third to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 2, 1}$, one accessory claw present, this being very small and the main claw long; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claw long. Last pair of coxae laterally armed.

Claw of female gonopods of moderate size, only slightly curved; distally showing two blunt teeth or lobes separated by only a slight reentrant angle and the outer larger than the inner; farther toward base is a small tooth on the ventral or outer edge. Basal spines 2 + 2.

Length 9.25 mm.

TYPE.—M. C. Z., No. 151. California: Santa Barbara.

PAMPIBIUS, gen. nov.

Head with lateral marginal breaks well marked.

Antennae short; in type species composed normally of twenty-four articles.

Ocelli present; seriate; single ocellus not largest.

Prosternal teeth 2 + 2; spines slender and distally bristle-like.

Posterior angles of none of the dorsal plates at all produced.

FIG. 3.—Distribution of *Pampibius*.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods tripartite. Basal spines $2 + 2$, long and slender. First article not excavated proximally.

Tarsi of anterior legs undivided.

In the male the fourth joint is conspicuously crassate, and bears a lobe at proximal end from which projects a brush of very long hairs.

Last two pairs of coxae laterally armed. Third joint of first ten pairs of legs with but one dorsal spine, that of only last two pairs with three, that of about first seven pairs unarmed ventrally. Fifth joint of first eleven pairs of legs, or of all these excepting first one or two, with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 0; claw single. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 2, 1 or 0, 1, 3, 2, 0; claw single. Dorsal spines of twelfth legs, 0, 0, 2, 1, 1; ventral 0, 0, 2, 3, 2. Dorsal spines of first legs 0, 0, 1, 2, 2 or 0, 0, 1, 1, 1; ventral, 0, 0, 0, 1, 1.

Length of type species 6.5–7 mm.

TYPE.—*P. paitius* (Chamberlin).

Only one species, found in North Carolina and Tennessee, is at present known.

PAMPIBIUS PAITIUS (Chamberlin).

Plate 3, fig. 1–4.

Lithobius paitius Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 37, pl. 3, fig. 6.

DESCRIPTION.—Dorsum pale brown. Head and posterior segments dark orange. Antennae dull yellow. Venter grey or greyish yellow. Legs pale, greyish, excepting the posterior pairs which are bright yellow, with the brush of hairs on the anal legs of male reddish proximally and yellow distally.

Body a little narrowed cephalad, with the first plate narrower than the third. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 50 : 45 : 47 : 53 : 52 : 50.

Head subcordate; caudal margin mesally distinctly incurved; moderately narrowed and rounded cephalad. Marginal breaks proportionately large and distinct. Wider than long in ratio 45 : 42.

Antennae short. Composed normally of twenty-four articles which are short between the second and the ultimate, and decrease distad; often submoniliform; ultimate article rather slender, moderately acuminate, clearly longer than the two preceding together.

Ocelli six to nine in two, or sometimes in three, series: *e.g.*, 1 + 4, 1;

1 + 4, 2; 1 + 4, 3, 1. Single ocellus smaller than any of upper series, or equal to most anterior. Ocelli of lower series very small (Plate 3, fig. 2).

Prosternum with median incision very narrow and sides nearly parallel in same. Teeth of each pair widely separated. Spine acutely acuminate, attached caudad of outer edge of outer tooth (Plate 3, fig. 1); 1.7 times wider than long. Distance between chitinous spots 2.25–2.32 times width at level of bottom of mesal incision; near 4.25 times the dental line.

First dorsal plate 1.8+ times wider than long; sides very convex; strongly narrowed caudad, with posterior corners strongly rounded. Caudal corners of ninth and eleventh dorsal plates rounded or shortly excised; those of thirteenth with caudal edge straight.

Coxal pores small: 1, 3, 3, 2; 1, 3, 3, 3; 1, 3, 4, 3; 2, 3, 3, 2; 2, 3, 3, 3; 2, 3, 4, 3; 2, 4, 4, 3; etc.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 1}$; of the third, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 3, 1}$; of the fourth to sixth, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 2}$; of the seventh, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 2}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 3, 2}$; of the eighth to tenth, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 1, 3, 2}$; of the eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 2, 1}$ or $\frac{1, 0, 3, 1, 1}{0, 1, 3, 2, 0}$, claw single; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw single. Last two pairs of coxae laterally armed.

In the anal legs of the male the third joint is clavately thickened and the fourth joint, in particular, is rather strongly crassate; the latter joint has at its proximal end on the dorsomesal side a lobe on the posterior surface of which is born a dense brush of very long hairs which extend caudad to or beyond the distal end of the joint (Plate 3, fig. 3).

Claw of female gonopods short; parallel-sided; well curved; tripartite, with the lateral lobes equal and not much shorter than the median. Spines relatively long and slender, the sides a little incurving at middle, apical acuminate portion short with denticle on each side at base; the two of each pair of nearly same length (Plate 3, fig. 4).

Length 6.5–7 mm.

TYPE LOCALITY.—Tennessee: Unaka Springs.

Also taken in North Carolina at Catawba.

PAITOBIOUS Chamberlin.

Can. ent., 1912, 44, p. 175.

Head with distinct marginal lateral interruptions.

Antennae short but often reaching seventh or eighth segment; composed of from twenty-six to thirty-four articles.

Ocelli from seven to twenty in from two to four series; single ocellus enlarged.

Prosternal teeth $2 + 2$; line of apices typically more or less pro-curved, the inner tooth of each pair being borne farther cephalad than the outer (Plate 4, fig. 3, 5). Spines distally bristle-like, median incision v-shaped.

Of the dorsal plates the posterior angles of ninth, eleventh, and thirteenth; of seventh, ninth, eleventh, and thirteenth; of sixth, seventh, ninth, eleventh and thirteenth, or sometimes of only the eleventh and thirteenth, are produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claws of female gonopods tripartite or rarely only bipartite; basal spines $2 + 2$, slender, acuminate from base. First article not excavated at base.

Tarsi of all legs divided.

Posterior legs of male not specially modified. Third to fifth article of anal legs more or less distinctly longitudinally furrowed above, a little more crassate in male.

Last one or two pairs of coxae laterally armed. Third joint of first six to eleven pairs of legs with two dorsal spines, or occasionally the first one to three pairs, and in one species the first eleven pairs, with but one dorsal spine or first one or two with none; others with three. Fifth joint of all legs between the second or third and twelfth or thirteenth pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 1 or 0, 1, 3, 2, 0, rarely 0, 1, 3, 3, 1; claws two or sometimes but one. Dorsal spines of penult legs 1, 0, 3, 1, 1, less commonly 1, 0, 3, 1, 0, 1, 0, 2, 1, 1 and even 1, 0, 3, 2, 1; ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws two or three. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 0, 0, 3, 2, 2 to 0, 0, 3, 1, 2 and 0, 0, 2, 1, 2. Dorsal spines of first legs 0, 0, 0, 1, 1 to 0, 0, 2, 2, 1; ventral 0, 0, 0, 0, 0 to 0, 0, 1, 2, 1, the usual formula.

Length of species 6.5 to 12 mm.

TYPE.—*P. carolinae* (Chamberlin).

The species of this genus, even in the case of the adults, in most cases show a purplish pigment which, at least in alcoholic specimens, tinges the muscles distinctly and modifies the color of the entire body, but is most evident in the anterior ventral plates, antennae and head, and the caudal pairs of legs. The anal legs are always dark proximally with the tarsi, or the tibiae and tarsi, conspicuously paler and usually yellow. The head and dorsum are smooth and shining, never rugose.

FIG. 4.— Distribution of *Paitobius*.

The species occur chiefly in the southeastern states, though one is known from Pennsylvania and another from New York City (Figure 4).

The species embraced under the fourth division (*aaaa*) in the following key may be regarded as constituting a separate subgenus, *Tunabius* (*P. zinus* Chamberlin, TYPE) differing from *Paitobius sens. str.*, including all the remaining species, in having either none or only the eleventh and thirteenth of the dorsal plates produced and in having the line of apices of prosternal teeth typically straight or slightly recurved.

Key to Species of Paitobius.

- a.* Posterior angles of sixth, seventh, ninth, eleventh, and thirteenth dorsal plates produced.
Ventral spines of anal legs 1, 3, 2, 1; of penult, 1, 3, 3, 2; dorsal spines of thirteenth legs 1, 0, 3, 2, 2. . . *P. arienus* (Chamberlin).
- aa.* Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced.
 - b.* Ventral spines of anal legs 1, 3, 3, 1; of the penult 1, 3, 3, 1.
P. juvenus (Bollman).
 - bb.* Ventral spines of anal legs 1, 3, 2, 0; of the penult, 1, 3, 2, 1.
P. carolinac (Chamberlin).
- aaa.* Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced.
 - b.* Anal leg with the claw single.
Ventral spines of anal legs 1, 3, 2, 1; of the penult, 1, 3, 3, 2; third joint of all legs with two or three dorsal spines.
P. naiwatus (Chamberlin).
 - bb.* Anal leg with two claws.
 - c.* Ventral spines of anal legs 1, 3, 2, 1 and of penult 1, 3, 3, 2.
 - d.* Dorsal spines of thirteenth legs 1, 0, 3, 2, 2; dorsal spines of first legs 2, 2, 1; third joint of first seven pairs of legs with two dorsal spines. . . . *P. tabius* (Chamberlin).
 - dd.* Dorsal spines of thirteenth legs 0, 0, 3, 1, 1 or 1, 0, 3, 1, 1; dorsal spines of first legs 2, 1, 1; third joint of first eleven or twelve pairs of legs with two dorsal spines.
P. adelus, sp. nov.
 - cc.* Ventral spines of anal legs 1, 3, 2, 0; of the penult also 1, 3, 2, 0. *P. simutis* (Chamberlin).
 - aaaa.* Posterior angles of only eleventh and thirteenth or of none of the dorsal plates produced. *Tunabius*, subgen. nov.

b. Anal leg with the claw single.

c. Ventral spines of penult legs 1, 3, 3, 1; third joint of first eleven pairs of legs with 2 dorsal spines.

P. watsuitus (Chamberlin).

cc. Ventral spines of penult legs 1, 3, 2, 0; third joint of first eleven pairs of legs with only one dorsal spine.

P. atlantac, sp. nov.

bb. Anal leg with two claws. (Ocelli ten or more in three series).

c. Dorsal spines of penult and of thirteenth legs 1, 0, 2, 1, 1; ventral spines of penult legs 1, 3, 2, 1; dorsal spines of twelfth legs, 0, 0, 2, 1, 2 *P. exceptus*, sp. nov.

cc. Dorsal spines of penult and of thirteenth legs 1, 0, 3, 1, 1; ventral spines of penult legs, 1, 3, 3, 1; dorsal spines of twelfth legs 0, 0, 3, 2, 2 or 0, 0, 2, 2, 2.

P. zinus (Chamberlin).

The key does not include *P. exiguus* (Meinert). (Cf. p. 302).

PAITOBIOUS ARIENUS (Chamberlin).

Lithobius arienus Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 47.

DESCRIPTION.—Dorsum brown, darkened caudad and sometimes, though less, cephalad. Head from brown and but little darker than the dorsum, with a transverse band along the frontal suture palest, to a darker, dusky or dull purplish, brown. Antennae brown suffused as usual, with purplish, distinctly darkened distad to the ultimate article, which is alone paler. Venter pale testaceous to brown, becoming, as usual, darker caudad, and the last several segments much darker, of a somewhat burnt brown tinge; anterior segments showing a weak violaceous or purplish tinge. Prosternum testaceous, not at all, or but little, darker than anterior sternites, or appearing in some dusky from a dull purplish pigment; prehensors paler ectad and distad, excepting the claw. Legs testaceous, with the tarsi more pigmented, or they may be suffused with the purplish pigment; anal legs much darker, deep purplish brown, but with the tarsi lighter.

Body robust, being seven times, a little more or less (σ^7), as long as width of the tenth dorsal plate; conspicuously narrowed from the eighth segment cephalad to the first. Eighth and tenth plates of equal width, much wider than the head; first plate clearly narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 41 : 39 : 43 : 46 : 50 : 50.

Head wider than long in about ratio 41 : 38. Subcordate, widest at marginal breaks. Caudal margin a little incurved mesally. A transverse furrow a little in front of and parallel with caudal marginal rim, its ends curving forwards to lateral breaks. A broad furrow on each side parallel with lateral margin as far forward as eye, and also a furrow each side of middle extending cephalad from transverse furrow. Smooth and shining, punctae few and indistinct.

Antennae reaching the seventh segment. Articles thirty-two to thirty-four, of moderate length; gradually decreasing in size from the second distad to the ultimate.

Ocelli fourteen to twenty in four or five series: *c. g.*, 1 + 4, 3, 3, 3, 1; 1 + 4, 4, 3, 3, 2; 1 + 5, 5, 5, 3, 1. Single ocellus much the largest, subvertically oval, with the narrower end ventrad. Seriate ocelli decreasing in size ventrad as usual.

Prosternum 1.5+ times wider than long. Teeth proper small and dark, but elevated on the usual obtusely angular protrusions of the anterior margin; line of apices distinctly procurved.

Sixth, seventh, ninth, eleventh, and thirteenth dorsal plates with posterior angles strongly produced, the processes of the sixth being more acute than those of the seventh. Major plates depressed along lateral and caudal borders. On elevated portion of each plate in front of caudal depressed border a transverse sulcus continuous at each end with a sublongitudinal sulcus running a little ectad of cephalad; and mesad of the latter are two other sulci the inner of which diverges from its mate of the opposite side caudad.

Sternites with a median longitudinal furrow most distinct on anterior portion of plate and a submarginal furrow as usual on each side. Two transverse furrows, one near middle and one a little cephalad of caudal margin.

Coxal pores small and circular: 3, 4, 4, 3; 4, 5, 5, 3; 4, 5, 5, 4.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 1, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$; of the second to fourth, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 0, 1, 2, 2 \end{smallmatrix}$; of the fifth, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ (or, in one specimen on one side only, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$); of the sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$; of the seventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the eighth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the ninth and tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; claws two; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$, claws two. Last two pairs of coxae laterally armed.

Male with anal and penult legs, as usual, moderately crassate. Fourth joint of anal legs thickened and dorsally complanate, with a conspicuous median longitudinal dorsal furrow, the third and fifth articles also similarly but more weakly furrowed. Corresponding articles of penult legs similarly but less strongly modified.

Gonopods of male showing a pale, conical, and apparently glabrous process extending caudoectad a little beyond edge of sternite, or sometimes wholly covered by the latter.

Length of types 10.5 to 11.5 mm. A specimen 10.5 mm. long has antennae 5 mm. long; anal legs (exclusive of coxae) 4.5 mm. long; tenth plate 1.6 mm. wide.

TYPE LOCALITY.—North Carolina: Hot Springs, August 6, 1910. Also taken in South Carolina at Taylors, August 3, 1910.

The female of this species is as yet unknown.

PAITOBIOUS JUVENTUS (Bollman).

Lithobius juvenus Bollman, Proc. U. S. N. M., 1887, **10**, p. 263, 1888, **11**, p. 342, 1889, **11**, p. 410. Chamberlin, Can. ent., 1911, **43**, p. 99, 101.
Paitobius juvenus Chamberlin, Can. ent., 1912, **44**, p. 175.

DESCRIPTION.—Brown. Head darker. Antennae brown proximally, fulvous at tips. Venter yellowish to brown. Legs like adjoining portion of venter; posterior legs apparently paler distally. Prehensors paler than prosternum.

Body about 7.25 times longer than width of tenth plate. Width of head and of first, third, eighth, tenth, and twelfth plates to each other as 50 : 47 : 49 : 59 : 61 : 56.

Head longer than wide in about ratio 52 or 53 : 50. Sides strongly rounded from breaks caudad about corners. Posterior portion of head with two longitudinal sulci diverging cephalad.

Antennae short. Articles, in type, thirty-one to thirty-two; short.

Ocelli 1 + 53; 1 + 4, 3, 3. Single ocellus moderate in size, the most caudal of uppermost series large.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2 times width at level of bottom of median incision; 3–3.25 times the dental line. Line of apices conspicuously procurved as usual.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates strongly produced, the processes of the last three being especially acute. Posterior margin of sixth plate straight.

Coxal pores small, circular; in types: 3, 4, 4, 3 and 4, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second and third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth to tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the eleventh and twelfth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{0(1), 0, 3, 1, 1}{0, 1, 2, 3, 2, 1}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$ or $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws two. In types, which are in poor condition, no lateral spines are detectable on posterior coxae but they may have been lost.

Claw of female gonopods of moderate length, rather wide, tripartite, the lateral lobes small and acute, the outer one being a little more proximal in position, and the median one longest and much broadest, acute. Basal spines slender, long and acutely pointed, subequal.

Gonopods of male small and wart-like, almost completely concealed.

Length 6.5–9 mm. A female 8 mm. long has antennae 3 mm. long, anal legs 3.5– mm. long; and tenth plate 1.1+ mm. wide.

TYPE LOCALITY.—Indiana: Bloomington (Bollman coll.).

Also taken in Tennessee at Mossy Creek (C. B. Branner coll.).

The description above is based upon two of the four type specimens from Bloomington.

PAITOBIOUS CAROLINAE (Chamberlin).

Plate 4, fig. 5, 6.

Lithobius carolinae Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 47.

Paitobius carolinae Chamberlin, Can. ent., 1912, 44, p. 175.

DESCRIPTION.—Dorsum from pale yellowish brown to dark brown and light chestnut, the posterior and anterior plates, especially the first one, darker and usually tinged with red or purplish red. Head dull purplish red to reddish chestnut, paler in a characteristic band along the frontal suture. Antennae dull purplish red proximally but pale distad. Prosternum dull brown of reddish tinge; prechensors paler ectad, testaceous, or with slight tinge of ferruginous. Venter from dilute brown or brownish grey to darker burnt brown, the more caudal plates darker and having the characteristic reddish tinge, while the anterior plates are often suffused with purplish. Legs nearly like corresponding portions of venter, becoming darker caudad, but the anal and penult pairs yellowish distad.

Body conspicuously narrowed from the eighth segment cephalad as usual. Tenth and eighth plates nearly equal in width, clearly wider than the head. 7.25 to 7.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 32 : 29 : 30 : 37.5 : 37.

Head suborbicular; almost precisely equal in length and breadth. Caudal margin straight. Somewhat depressed transversely in front of caudal marginal thickening and longitudinally a little mesad of each lateral margin and also a little each side of the median line, the depressions usually wide and shallow. Head smooth and shining, the few punctae present being very fine. Hairs sparse, in part long.

Antennae short, reaching to the sixth or the beginning of the seventh segment. Composed mostly of from thirty to thirty-five articles which distad of the third are short and very short, the shortest ones often alternating singly or in groups with longer ones.

Ocelli from eleven to sixteen in three or, less commonly, in four series: *e. g.*, 1 + 5, 4, 3; 1 + 4, 3, 3; 1 + 5, 4, 3, 3. Single ocellus moderate in size, a little obliquely elliptic, commonly not much larger than the most caudal one of the uppermost series which, as usual, is elongate longitudinally; other ocelli decreasing in size cephalad and ventrad.

Prosternum 1.5 times wider than long or slightly wider. Teeth proper small but borne forwards as usual, with the line of apices distinctly procurved. Spines in usual position, bristle-like distally.

Posterior angles of seventh, ninth, eleventh, and thirteenth dorsal plates produced, the processes of the last three being acute, those of the seventh more obtuse. Posterior angles of sixth plate typically rounded or somewhat excised. All major plates furrowed transversely a little in front of caudal margin and longitudinally within each lateral margin. Elevated portion of each plate with a longitudinal furrow a little each side of median line and a second one farther ectad. Otherwise the plates are smooth and shining, not at all rugose. Hairs very short and sparse.

Ventral plates longitudinally depressed or furrowed between median line and each lateral margin, the furrows most distinct caudad. Anterior plates transversely depressed between bases of legs and, on more caudal plates, a second transverse furrow appearing as usual, in front of the caudal margin.

Coxal pores circular, the most proximal on each coxa often very small: 3, 4, 4, 3; 4, 5, 5, 4; 4, 5, 4, 3.

Tarsi of all legs biarticulate, but those of anterior pairs with division often indistinct. Anal and penult legs short, considerably inflated in both sexes, but somewhat more so in the male. In both the femur is widened and is more or less flattened above and longitudinally furrowed, the prefemur and tibia likewise distinctly longitudinally furrowed. Penult leg similarly furrowed, but less crassate. Thirteenth legs with third, fourth, and fifth joints longitudinally furrowed above toward each side, the two furrows leaving a low ridge-like elevation between them. The other legs similarly furrowed but less and less distinctly so in going cephalad, the legs being more or less distinctly laterally compressed and somewhat furrowed longitudinally along sides of joints.

Spines of first legs, $\frac{0,0,2,2,1}{0,0,1,2,1}$ or $\frac{0,0,2,2,1}{0,0,0,2,1}$, rarely $\frac{0,0,2,2,1}{0,0,0,1,1}$; of the second, $\frac{0,0,2,2,1}{0,0,1,2,1}$; of the third to seventh, $\frac{0,0,2,2,2}{0,0,1,2,1}$; of the eighth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ or $\frac{0,0,3,2,2}{0,0,1,2,1}$; of the ninth, $\frac{0,0,2,2,2}{0,0,1,2,1}$ to $\frac{0,0,3,2,2}{0,0,1,2,2}$; of the tenth and eleventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the twelfth, $\frac{0,0,3,1,2}{0,0,2,3,2}$ or, rarely, on one side, $\frac{0,0,3,2,2}{0,0,2,3,2}$; of the thirteenth, $\frac{1,0,3,1,1}{0,1,3,2,2}$; of the penult, $\frac{1,0,3,1,1}{0,1,3,2,1}$, claws two; of the anal, $\frac{1,0,3,1,0}{0,1,3,2,0}$ (or in a partly regenerated leg observed also as $\frac{1,0,3,0,0}{0,1,3,0,0}$), claws two. Last pair of coxae laterally armed.

Claw of female gonopods short and relatively rather broad, thin, and well curved; tripartite, the outermost, or most ventral, lobe smallest and sometimes almost obliterated, the median considerably longest, all acute. Basal spines moderately long and slender, the inner usually somewhat more slender than the outer; both gradually narrowing distad from base to more acuminate apical portion, with edges of latter portion sometimes minutely denticulate.

Length 8.5 to 10 mm. A female 9.5 mm. long has antennae 3.8 mm. long; anal leg 3.2 mm. long; and tenth plate 1.3 mm. wide.

Praematurus.—Testaceous or pale brown, with anterior and posterior plates reddish. Head brownish to dull purplish red, with the transverse pale band along the frontal suture as in the adult. Antennae from light to dark dull purplish red, pale distad. Prosternum and prehensorial feet as in *maturus*. Venter pale testaceous, the anterior plates suffused with light purple, the caudal plates darkened as usual. Caudal pairs of legs dark proximally and light, yellowish, distad.

Antennae as in adult or nearly so, the number of articles complete, short, and very short.

Ocelli 1 + 4, 3, 2; 1 + 4, 3. Single ocellus frequently smaller than most caudal one of upper series, which is large. Ocelli of most ventral row small.

Prosternum as in adult.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced acutely, those of the seventh somewhat more weakly produced than in the adult.

Coxal pores: 3,3,4,3; 3,4,4,3; small, the most proximal especially so.

Claw of female gonopods shorter and less curved than in adult, pale and thin; the three lobes distinct but the outermost minute and the median much the longest, all acute. Spines nearly conical, uniformly narrowing from base to apex, the inner spine on each side only about one fifth shorter than the outer, the two spines in this form appearing to develop more nearly simultaneously than is usual in most of the Lithobiidae. Bristles fewer than in *maturus*.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$ to $\frac{0, 0, 1, 1, 1}{0, 0, 0, 0, 0}$; of the second to fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 0, 2, 1}$; of the fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the sixth and seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; of the twelfth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ (1); of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 2, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$.

Length 7 to 7.5 mm. A specimen 7 mm. long has antennæ 3.25 mm. long; and anal legs 2.75 mm. long.

TYPE LOCALITY.—North Carolina: Asheville.

Found also in North Carolina at Hot Springs. South Carolina: Landrum. Tennessee: Russellville.

The statement (Ann. Ent. soc. Amer., 1911, 4, p. 47) that the angles of the sixth plate are produced was due to several specimens of *aricus* (from Taylors, S. C.) having been included in the description.

PAITOBIOUS NAIWATUS (Chamberlin).

Plate 4, fig. 3, 4.

Lithobius naiwatus Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 42.

Paitobius naiwatus Chamberlin, Can. ent., 1912, 44, p. 175.

DESCRIPTION.—Dorsum from light brown to dark brown and chestnut, the caudal segments darkest, often dark brownish purple. Head from dark brown, in the paler specimens, to deep purplish brown or purplish chestnut in the darker ones; mostly uniform, but the frontal region sometimes a little lighter. Antennae concolorous with head proximally, becoming pale distad, the end portion being from yellow to rufous. Venter yellowish brown to brown, the sternites normally becoming darker from the anterior ones caudad, the last four or five plates being especially dark, often dull reddish brown. Prosternum dark brown, usually suffused with purplish; prehensors paler, light ferruginous or rufous distad. Legs yellow to brown, the last two pairs dark purplish brown to purplish black excepting the tarsi, or tibiae and tarsi, which are light.

Body robust, being relatively very wide; conspicuously narrowed cephalad; typically only about six times longer than width of the tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 87 : 80 : 77 : 95 : 100.

Head widest between eyes and marginal breaks as usual. Caudal margin nearly straight. Smooth and shining, not at all roughened; a few minute and scattered punctae. Equal in length and breadth, or slightly wider.

Antennae of moderate length, normally reaching to the eighth segment, or sometimes to the ninth. Articles beyond the second of moderate length and either uniform throughout or those of the distal two thirds may be considerably shorter than the others. Articles from thirty-two to thirty-six. Bristles long, not very dense.

Ocelli ten to sixteen in three or four series: *e. g.*, 1 + 4, 3, 2; 1 + 4, 4, 4; 1 + 4, 4, 3, 1; 1 + 4, 3, 3, 2; 1 + 4, 4, 4, 3. Single ocellus much the largest, subvertically elliptic, often paler than the others. Series regular, the ocelli of the most dorsal one often separated by a small space from each other, especially so those toward the caudal end. Organ of Tömösvary in outline of about same size as an average sized ocellus, a little cephaloventrad of eye-patch.

Prosternal teeth 2 + 2 or rarely 1 + 2; those of each pair separated by a rather wide space; margin extended beneath each tooth; line of apices procurved. 1.6 times wider than long.

All major dorsal plates with a lateral longitudinal furrow parallel with, and but little removed from, lateral margin, and all but the first with a sublongitudinal furrow each side of the middle running from anterior end obliquely ectocaudad, a third weaker furrow being also more or less evident between this and the submarginal one. Not roughened. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced.

Ventral plates, excepting the first one, with a distinct median longitudinal sulcus impressed only at anterior end on the more cephalic sternites but becoming longer and more distinct on the caudal ones. On the more caudal sternites there is commonly a deep impression in the form of an inverted v which is most acute on the last plates, the mark becoming more obtuse and less and less distinct in going forwards.

Coxal pores mostly small, pale edged, strictly circular, decreasing proximad on each coxa as usual: 3, 4, 4, 3; 4, 4, 5, 4; 4, 5, 5, 4; 5, 5, 5, 4; 5, 6, 5, 4; etc.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 1, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the fourth and fifth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the seventh to the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 2, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws two; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$, the claw single. Only the last pair of coxae laterally armed.

Anal and penult legs in male short, moderately thickened, with the tarsi more or less abruptly more slender; fourth joint clavately thickened, dorsally a little complanate and longitudinally furrowed above, the corresponding article of penult legs being similarly furrowed but

not enlarged. These legs are similar in the female but are less thickened and have the furrows weaker.

Claw of female gonopods rather slender and thin; tripartite, the lobes acute, with the median longest. Spines of each pair equal in size or nearly so; moderately narrowing from base to distal third and then more abruptly running to an acute point.

Gonopods of male broad at base; distally broadly rounded to subconic.

Length from 9.5 to 13 mm.

Pseudomaturus.—Coloration similar to that of adult but prevalently somewhat paler throughout.

Antennae as in adult but articles relatively somewhat shorter.

Ocelli 1 + 443; 1 + 5, 4, 3; larger than in the *prae-maturus*.

Coxal pores: 3, 4, 4, 3 to 4, 5, 5, 4, small.

Claw of female gonopods smaller and paler than in adult, especially in specimens toward the *prae-maturus* stage, with lateral lobes relatively somewhat smaller. Basal spines as in adult, or the inner one of each pair a little more slender and shorter relatively.

Spining of legs in older specimens as in adult while youngest ones may have formulae as follows:—fourth and fifth pairs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; seventh and eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; tenth and eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; thirteenth, $\frac{1, 0, 3, 1, 2(1)}{0, 1, 3, 3, 2}$; penult, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 2}$; anal as in adult. Last pair of coxae laterally armed.

Length 7.5 to 9 mm. (Saluda, N. C.).

Prae-maturus.—Dorsum brown. Head chestnut suffused with purple. Antennae dark like the head but more distinctly purplish proximally; light distally. Prosternum brown, the prehensors lighter, especially distad. Venter pale greyish yellow to yellowish brown, more brown caudad. Legs pale, the two last pairs darker and suffused with purple proximally, yellowish distally.

Antennae composed of thirty to thirty-one articles which are mostly of moderate length as in adult, but shorter ones occur at intervals in pairs.

Ocelli ten to thirteen in three series: *e. g.*, 1 + 4, 3, 2; 1 + 5, 3, 3; 1 + 5, 4, 3. Of the seriate ocelli the most caudal one of top series is relatively large.

Coxal pores very small, pale: 3, 4, 4, 3.

Claw of female gonopods pale throughout, moderately curved, the three lobes present but the median one much exceeding the lateral ones, which appear as small but distinct teeth. Inner spine of each pair about one half the length of the outer one.

Spines of first legs, $\frac{0, 0, 1(0), 1, 1}{0, 0, 0, 0, 1(0)}$; of the second, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$; of the third and

fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 0, 1, 1}$; of the fifth, $\frac{0, 0, 2, 2, 1}{0, 0, 0, 2, 1}$; of the sixth to eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the tenth and eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the thirteenth, $\frac{0, 0, 2, 1, 1}{0, 1, 2, 2, 2}$; of the penult, $\frac{0, 0, 1, 0, 0}{0, 1, 3, 2, 0}$ or $\frac{0, 0, 1, 1, 0}{0, 1, 3, 2, 0}$; of the anal, $\frac{0, 0, 3, 0, 0}{0, 1, 3, 1, 0}$, $\frac{0, 0, 3, 0, 0}{0, 1, 3, 2, 0}$ or $\frac{0, 0, 1, 0, 0}{0, 1, 2, 1, 0}$. No lateral spine as yet manifest on last coxae.

Length near 7 mm.; antennae 3.5 mm.; anal legs cir. 2.5 mm. (Linville Falls, N. C.).

TYPE LOCALITY.—North Carolina: Saluda.

Found also in North Carolina at Catawba and Linville Falls. South Carolina: Landrum. Georgia: Tallulah Falls.

PAITOBIOUS TABIUS (Chamberlin).

Plate 5, fig. 1.

Lithobius tabius Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 44.

DESCRIPTION.—Dorsum dark brown, either not at all or but slightly darker caudad. Head and first dorsal plate much darker, chestnut of a dull purplish red tinge. Antennae concolorous with head, pale distad. Venter light brown anteriorly, becoming darker and darker caudad; in some the entire venter is suffused with purplish. Legs pale brown, paler ventrally than dorsally, with tarsi yellow; often suffused with purplish; legs becoming darker caudad, the two last pairs especially deep in color, brown of a dull purplish cast, with the tarsi orange or light ferruginous. Prosternum similar in color to the head but of a somewhat paler shade, the prehensors lighter, dull ferruginous. The characteristic reddish purple tint may be more or less evident throughout the body.

Body considerably and uniformly narrowing from the tenth plate cephalad, with the head and the tenth plate of nearly the same width. Body typically near seven times as long as the width of the tenth plate. Widths of head and of first, third, eighth, and tenth, plates to each other as 43 : 36 : 36 : 42 : 43.

Head suborbicular, with the sides conspicuously and rather evenly convex and the caudal margin weakly excurved. Equal in length and width or very nearly so, widest between eyes and marginal breaks. Head usually rather broadly and shallowly depressed a little each side of the median line from near caudal margin a variable distance cephalad. Not at all punctate or rugose, smooth and shining.

Antennae short, reaching toward end of seventh segment or, occasionally, only to the fifth. Articles between the second and ultimate

moderately short, not much varying in proportions; in number mostly from thirty to thirty-four.

Ocelli nearly always in four series, occasionally in but three; from fourteen to twenty in number: *e.g.*, 1 + 4, 4, 3, 3; 1 + 4, 4, 4, 3; 1 + 4, 4, 5, 4; 1 + 4, 5, 4; 1 + 4, 5, 3. Single ocellus well separated, not larger than most caudal one of most dorsal series. Ocelli of caudal portion of most dorsal series much larger than the others, longitudinally more or less elongate. Ocelli decreasing markedly in size from above ventrad and in each series from caudal end cephalad.

Prosternum 1.5 times wider than long. Distance between chitinous spots 2.25 times greater than width at level of bottom of median incision; 3.2 times the dental line. Line of apices procurved in the typical manner. Spine distally bristle-like.

First dorsal plate smooth and shining; a transverse furrow a little in front of caudal margin curving cephalad at each side and extending to anterior border. Other major plates marked with a pair of distinct longitudinal furrows on the median portion, with, between them, a more shallow median furrow, all the furrows becoming deeper on the more caudal plates; a transverse furrow a little ways in front of the caudal margin, this laterally bending cephaloetad and entering a submarginal lateral furrow which on the more caudal plates is wide and deep, though only weakly developed on the anterior ones; a furrow running obliquely from each anterior corner to meet or nearly meet the longitudinal dorsal furrow of the corresponding side.

Ventral plates mostly convexly curving from ends to middle. The usual longitudinal furrow mesad of each lateral margin mostly weak; a weak median longitudinal furrow often evident, this most distinct on anterior portion of plate; the usual transverse furrow in front of caudal border more or less distinct, while on some plates a second transverse furrow farther cephalad may be seen.

Coxal pores circular or a little transversely elongate, of moderate size. Porigerous area more or less depressed and marked off by lateral elevated rims: 4, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 3.

Spines of first and second legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$; of the fourth to seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the eighth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$, one ventral spine of third joint very small or occasionally absent, giving formula $\frac{0, 0, 3, 2, 2}{0, 0, 1, 3, 2}$; of ninth to eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$, claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$ or, in one specimen on one side only, observed as $\frac{1, 0, 3, 2, 0}{0, 1, 3, 2, 1}$, claws two. Last two pairs of coxae laterally armed.

The anal and penult legs are short in both male and female. In the

male the anal legs are moderately crassate, the thickening being most marked in the fourth joint which is typically wide and is deeply, longitudinally furrowed along the dorsal surface, the furrow being deepest and widest at the middle of its length; tibia also with a similar, but shallower, longitudinal furrow as also, but less distinctly, the prefemur; tarsus abruptly more slender than the tibia. Penult legs somewhat less crassate; similarly furrowed. The immediately preceding legs with prefemur and femur complanate above and with a dorsal longitudinal sulcus toward each lateral edge, a ridge-like elevation between the two; sulci most marked on femur; more anterior legs similarly but less distinctly marked. Most of the legs somewhat compressed, the joints proximad of tarsus, especially tibia and femur, more or less longitudinally furrowed along each lateral surface. In the female the legs are similar but the posterior pairs are less inflated, with the femur not conspicuously broadened, the tarsi not abruptly more slender, and the sulci less distinct. All tarsi biarticulate.

Claw of female gonopods moderately slender, thin, considerably curved; bipartite, the outer lobe usually obtusely angular and much longer than the more acute inner one. Basal spines subequal, rather slender, very acutely pointed. The statement in the original description that the claw is tripartite is a typographical error.

Length 9.5–10.5 mm. A male 10.5 mm. long has antennae cir. 5 mm. long and anal legs cir. 4 mm. long, with tenth plate 1.55 mm. wide.

TYPE LOCALITY.—Tennessee: Johnson City, August 9, 1910.

PAITOBIOUS ADELUS, sp. nov.

Plate 5, fig. 3.

DESCRIPTION.—Dorsum yellowish brown to dark brown. Head distinctly darker, dusky chestnut; either the entire frontal region paler or paler only in a band along the suture. Antennae like head proximally, paler distad. Venter yellowish to light brown. Prosternum darker, somewhat chestnut-brown, the prehensors a little lighter. Legs brownish; the caudal pairs as usual, darkest, lighter mesally, ventrally, and distally than dorsally and ectally.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 52 : 46 : 50 : 59 : 57 : 55.

Head nearly equal in length and breadth or but slightly longer (53 : 52). Much narrowed cephalad. Caudal margin straight.

Antennae short, typically reaching only to the fifth segment; strongly attenuated distad. Articles twenty-seven to thirty-one, twenty-nine being the number most commonly observed. Articles distad of the second very short and closely united. Ultimate article considerably longer than the two preceding taken together.

Ocelli mostly twelve or thirteen in three, or, less commonly, in four series: *e. g.*, 1 + 4, 4, 4; 1 + 4, 4, 3; 1 + 4, 3, 3, 2.

Single ocellus usually distinctly largest, or sometimes of about same size as the most caudal one of dorsal series; others decreasing cephalad and ventrad.

Prosternum 1.6 times wider than long. Distance between chitinous spots 2.8— times greater than width at level of bottom of median incision; 3.5— times the dental line. Teeth acute, moderate in size; line of apices clearly procurved. Median incision narrowly v-shaped, the distance between apices of two mesal teeth less than that between apices of teeth of each pair.

First dorsal plate widest a little caudad of the anterior end, its sides convex and conspicuously converging to the rounded caudal corners; 1.8 times wider than long. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced, but the processes rather short and somewhat obtuse.

Coxal pores moderate in size, distinct, or the most proximal may be very small; typically 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 1, 1}$ or $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 1, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the eighth to tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; of the eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{0, 0, 3, 1, 1}{0, 1, 2, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claws two. Last two pairs, or occasionally only last pair, of coxae laterally armed.

Claw of female gonopods rather short and wide, tripartite, with all divisions acute and the median considerably broader and longer than the lateral. Spines long and slender, the outer one usually only slightly narrowed from base to the acuminate distal portion, which is apically narrowly rounded and usually has a denticle on each side at base; inner spine more uniformly acuminate from base to apex, with a denticle on outer side near middle.

Length 6.5–8 mm.

TYPE.—M. C. Z. No. 128, Pennsylvania: Upsal.

Also taken at Philadelphia; found in considerable numbers under fallen leaves and limbs in chestnut and oak groves. Probably a close ally of *P. exiguus* (Meinert).

PAITOBIOUS SIMITUS (Chamberlin).

Lithobius similis Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 44.

Paitobius similis Chamberlin, Can. ent., 1912, 44, p. 175.

DESCRIPTION.—Dorsum brown. Head, first plate, and posterior plates darker, reddish brown, the head sometimes paler over frontal region.

Antennae very dark proximally, dull purplish red-brown, much lighter at tips. Prosternum dark, somewhat dusky, brown; preheaters paler, testaceous or yellow, especially ectad and distad. Anterior portion of venter light brown and suffused with purplish, becoming darker caudad, the last plates being dark brown. Legs mostly very pale brown with the tarsi clear yellow, the anterior pairs suffused with purplish, anal and penult pairs dark proximally and yellow distally, especially on mesal surface.

Body conspicuously narrowing from the eighth plate cephalad to head, the first plate narrower than the third, and the eighth and tenth of equal width. From 7.5 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 27 : 24 : 26 : 29 : 29.

Head suborbicular, widest back of eyes where the sides are weakly convex; from breaks caudad the sides are convex and converge considerably. Caudal margin straight or very nearly so. Head clearly longer than wide (25 : 23). Smooth and shining, not punctate.

Antennae very short, reaching only to the fifth body segment. In types composed of twenty-seven to thirty-three articles of which those distad of the second are very short and closely compacted, becoming relatively a little longer and looser distad.

Ocelli seven or eight in two series: 1 + 4, 3; 1 + 3, 3. Single ocellus somewhat paler, subcircular, not at all, or but little, enlarged. Other ocelli deeply pigmented, decreasing markedly cephalad, the most anterior one of each series being very small.

Prosternum 1.5 times wider than long. Inner dental process on each side somewhat larger than the outer as usual, and line of apices more or less procurved.

Major plates depressed within each lateral margin and across dorsum a little cephalad of caudal margin, in the latter case especially appearing as a distinct furrow. Each major plate excepting the first with a distinct longitudinal furrow each side of the middle line, the two diverging a little caudad, especially near the ends, where they often

bend ectad in the caudal transverse depression or furrow; between each of these furrows and the corresponding submarginal depression is another distinct furrow which becomes deeper and broader on the more caudal plates as do also the others. Posterior angles of the ninth, eleventh, and thirteenth dorsal plates acutely produced.

First sternite with a median longitudinal depression. Others mostly clearly longitudinally depressed mesad of each lateral margin. A transverse furrow cephalad of caudal margin as usual, this more pronounced on the most caudal sternites.

Coxal pores small, decreasing regularly proximad on each coxa; circular and pale edged: 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\begin{smallmatrix} 0, 0, 0, 1, 1 \\ 0, 0, 0, 0, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$; of the second and third, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the fourth to sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the seventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$; of the eighth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$; of the ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0(1), 2(3), 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claws two; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claws two. Last two pairs of coxae laterally armed, though spines of penult pair may be minute and difficult to detect.

Anal and penult legs in female short and moderately enlarged. Fourth article in anal legs somewhat flattened above and longitudinally furrowed, the third and fifth articles less distinctly sulcate.

Claw of female gonopods of moderate size, but little curved; tripartite but the most ventral lobe much the smallest and sometimes scarcely distinguishable, median much the largest, all acute. Basal spines subequal in length but the outer typically somewhat stouter than the inner, narrowing gradually from base to distal fourth or fifth of length and then more abruptly narrowing to an acute point, sometimes showing denticles at beginning of distal portion. Bristles few.

Length of type 7.7 mm.; antennae 2.5 mm. long; anal legs near 3 mm. long; tenth plate near 1 mm. wide.

TYPE LOCALITY.—Mississippi: Grenada, July 15, 1910.

PAITOBIOUS WATSUITUS (Chamberlin).

Lithobius watsuitus Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 38 (ad part. Atlanta specimen).

DESCRIPTION.—Dorsum light brown. Head much darker, reddish brown, or chestnut. Prosternum colored like the head but prehensors paler distad. Antennae dark brown, paler distad. Anterior plates of venter commonly tinged with purplish. Most legs light yellowish

brown but the caudal pairs darker brown, excepting the tarsi which are light.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 47 : 41 : 43 : 53 : 52.5 : 50.

Head broadly subcordate; caudal margin straight or very weakly convex; moderately narrowed and well rounded cephalad. Equal in length and breadth or slightly longer (48 : 47).

Antennae short. Articles thirty to thirty-two which, beyond the third, are short and very short and are closely united; ultimate much longer than the two preceding taken together.

Ocelli about eight in two series: *c. g.*, 1 + 4, 3.

Prosternum in type 1.5 times wider than long. Distance between chitinous spots 2.53 times width at level of bottom of mesal incision; 3.2 times the dental line. Mesal tooth on each side more elevated than the outer and the line of apices a little procurved. Mesal incision v-shaped.

First dorsal plate with sides very convex, strongly narrowed caudad; 1.8 times wider than long. Posterior angles of eleventh and thirteenth plates distinctly, though not strongly, produced, those of the thirteenth the more so.

Coxal pores very small: 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 0, 0, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 0, 1, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 0, 2, 1}$ (right of type) or $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ (left of type); of the fifth and sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ (left of type) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ (right of type); of the seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$ (right) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ (left); of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, claws two or with trace of an anterior accessory claw in addition; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one.

Anal and penult legs in the male moderately crassate, especially so the fourth joint which is somewhat flattened dorso-ventrally and is longitudinally weakly furrowed in the usual way.

Length of type 7.5 mm.

TYPE LOCALITY.—Georgia: Atlanta, August, 1910.

PAITOBIOUS ATLANTAE, sp. nov.

DESCRIPTION.—Dorsum yellowish, with the posterior plates light orange. Head orange. Antennae orange proximally, paler distad. Prosternum orange. Venter very pale; caudal plates light orange. Legs pale like the venter, the posterior pairs correspondingly more strongly pigmented, brown of an orange tinge.

Body about 8-8.25 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36 : 34 : 36 : 43 : 43 : 40.

Head a little longer than wide (37.5 : 36). Strongly narrowed cephalad from eyes. Hairs sparse, both long and short intermixed.

Antennae short. Articles from twenty-five to twenty-seven, short and very short, submoniliform. Ultimate article long. Hairs moderate, not very dense.

Ocelli 1 + 3, the first or most caudal ocellus of the series larger than the single ocellus. Pale.

Prosternum 1.7 times wider than long. Distance between chitinous spots 2.25 times greater than width at level of bottom of median incision; four times as great as the dental line. Median incision moderately large, strictly v-shaped, acute at bottom. Teeth small, acute, equal or nearly so; line of apices straight or even slightly recurved. Tubercle of spine rather prominent; spine more slender than teeth but less bristle-like than usual, but slightly longer than the teeth.

First dorsal plate with sides moderately convex and moderately converging caudad; widest a little in front of middle; 1.8 times wider than long. Posterior angles of none of the dorsal plates produced, those of the ninth, eleventh, and thirteenth simply rounded or a little obliquely excised.

Coxal pores small, circular: 2, 2, 2, 2; 2, 2, 3, 3; 2, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 0, 2, 2}$; of the third to tenth, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 2}$ or $\frac{0, 0, 1, 2, 2}{0, 0, 2, 2, 2}$; of the eleventh, $\frac{0, 0, 1, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 2, 1, 0}{0, 1, 3, 2, 0}$; claw one (two); of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last pair of coxae laterally armed.

Posterior legs of male moderately and uniformly inflated. Without any special lobes. Fourth and fifth joints, more particularly, laterally, longitudinally sulcate.

Claw of female gonopods moderate in length and curvature; tripartite, the median lobe much the longest, the lateral ones subequal and at the same level, all acute. Spines 2 + 2; subequal; slender; attenuated from base distad, the sides convex and more strongly converging immediately proximad of tip; sides denticulate. Inner side of first article nearly straight.

Length 6-7 mm. A female 6.75 mm. long has antennae 2.2 mm. long and tenth plate .82 mm. wide.

TYPE.—M. C. Z., No. 130. Georgia: Atlanta.

PAITOBIOUS EXCEPTUS, sp. nov.

DESCRIPTION.—Dorsum pale brown, the first few and the last few plates considerably darker. Head darker brown of light chestnut cast. Antennae brown of purplish tinge proximally, pale distally. Prosternum dark brown with prehensorial feet much lighter, testaceous. Venter very pale, the anterior plates strongly suffused with violaceous, the caudal ones darker, brown. Legs like the contiguous plates of venter, the posterior pairs being brown excepting distally, where they are light in color.

Body of type about $8\frac{1}{3}$ times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 45 : 39 : 40.5 : 48 : 48 : 44.

Head in type somewhat longer than wide (47 : 45). Sides rather strongly convex and converging from lateral breaks caudad.

Antennae short as usual; articles in types, twenty-nine (or, on one side in one specimen, twenty-six).

Ocelli eleven or twelve in three or four series: *e.g.*, 1 + 4, 3, 3; 1 + 4, 4, 3; 1 + 4, 3, 3, 1. Single ocellus largest. Others regular in form and arrangement.

Prosternum in type 1.48 times wider than long. Distance between chitinous spots 2.53 times width at level of bottom of median incision; 2.9 times dental line. Median incision strictly v-shaped, sides straight. Teeth acute, of moderate size; line of apices straight. Spines slender. Lateral slopes straight, beginning at spine and extending directly ectocaudad, the anterior portion of prosternum being correspondingly narrowed.

First dorsal plate with sides convex and converging caudad from a little in front of middle; in type 1.77 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates a little produced.

Coxal pores small and round as usual: 2, 2, 3, 2; 2, 3, 3, 2.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 0, 1}$ or $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 1, 2, 1}{0, 0, 0, 2, 1}$; of the third to sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the ninth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 2}{0, 0, 2(3), 3, 2}$; of the thirteenth, $\frac{0, 0, 2, 1, 1}{0, 1, 2(3), 3, 2}$; of the penult, $\frac{1, 0, 2, 1, 1}{0, 1, 3, 2, 1}$, claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claws two, with dorsal spine of coxa sometimes doubled.

Anal and penult legs of male short; but little and uniformly thickened. Third, fourth, and fifth articles longitudinally sulcate dorsally, the fourth article most distinctly so.

Length of type (σ^7) 7.5 mm.

Female unknown.

TYPE.—M. C. Z., No. 129. Alabama: Jackson.

PAITOBIVS ZINUS (Chamberlin).

Plate 5, fig. 2.

Lithobius cantabrigensis zinus Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 41.

DESCRIPTION.—Testaceous to brown, with the posterior segments darker, not of reddish tinge, the anterior plates sometimes tinged with violaceous. Head dark brown, not of reddish tinge. Antennae purplish brown, pale at tips. Prosternum brown of a lighter shade than head, the prehensors paler. Venter dilute testaceous, the caudal plates darker, burnt brown. Legs nearly like corresponding plates of venter; the posterior pairs brown, somewhat paler distally.

Body moderately robust; 7.5 (Thomasville) to 8 times longer than width of tenth plate, conspicuously narrowed from eighth segment cephalad to first plate which is much narrower than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 25 : 23 : 24 : 28 : 27 : 26.

Head well rounded, suborbicular, from about equal in length and breadth to a little longer (51 : 49). Caudal margin mesally straight. Hairs of moderate length, sparse.

Antennae reaching sixth or seventh, or, sometimes, the beginning of the eighth segment. Articles twenty-eight to thirty-five which are mostly very short.

Ocelli eleven to sixteen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 3, 4, 3; 1 + 4, 4, 4; 1 + 4, 4, 4, 3. Single ocellus moderate, only a little largest. Ocelli of dorsal row larger than others of series as usual.

Prosternum 1.47–1.48 times wider than long in types. Distance between chitinous spots 2.56–2.7 times width at mesal incision; 3.1–3.34 times the dental line. Median incision rather narrowly v-shaped, with the sides nearly straight. Teeth of each pair well separated, the incision semicircular, the sides of teeth toward each other slanting more than the others; inner tooth larger than the outer but not borne farther forwards, so that the line of apices is a little recurved. Sides slanting directly ectocaudad from spine, and straight or nearly so.

First dorsal plate 1.78–1.8 times wider than long; sides strongly convex anteriorly, the plate being widest some distance caudad of the anterior end; sides converging strongly caudad. Caudal margin of ninth plate straight. Posterior angles of eleventh and thirteenth dorsal plates weakly produced.

Coxal pores: 2, 3, 3, 2; 3, 4, 4, 3. Small, the distal one on each coxa decidedly larger than the others which decrease proximad.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the second and third, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 2, 1}$; of the fourth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$ (Thomasville) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the sixth and seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$ (Thomasville) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$ to $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$ (Thomasville); of the tenth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$ (Thomasville) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$ (Thomasville) or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the twelfth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ to $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$ (or $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$, Thomasville var.); of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, claws two, or with minute anterior one also evident; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claws two. Last one, or two (Thomasville), pairs of coxae laterally armed.

Claw of female gonopods of moderate size; but little curved; acute, with a small acute tooth toward base on ectal side and a similar one on mesal side. Spines long and slender, but slightly or not at all converging from base to the relatively very short apical portion, which occupies only a fourth or a fifth of the total length. Mesal side of first article straight or only slightly incurved.

Length 7.5 to 10 mm. A female 7.75 mm. long has antennae 3.75 mm. long; anal leg 3 mm. long; and tenth plate .98 mm. wide.

TYPE LOCALITY.—North Carolina: Brown's Summit.

Taken also in Virginia at Chatham, Natural Bridge, Lynchburg, Balcony Falls. Alabama: Anniston, Thomasville (variety). Tennessee: Johnson City. Georgia: Tallapoosa.

PAITOBIOUS EXIGUUS (Meinert).

Lithobius exiguus, Meinert, Vidensk. meddel. naturhist. foren. Kjoben, 1886, 1884-1886, p. 110. (nec Chamberlin, Ann. Ent. soc. Amer., 1911, 4, p. 40; Can. ent., 1911, 43, p. 104).

The original description is as follows:—

Brunneus, corpore subtus pedibusque pallidioribus, capite fulvo; sat gracilis, sublaevis, capite suborbiculari, fere aequae longo ac lato.

Antennae breviusculae, 31-articulatae (articulis brevissimis).

Oculi ocellis 7, in series 2 digestis.

Dentes prosternales bini.

Pori coxales 2, 3, 3, 2-3, 4, 4, 3, rotundati.

[Laminae dorsales omnes angulis rectis.]

Pedes corporis primi paris calcaribus 0, 0, 1; pedes anales calcaribus 1, 2, 1, 0-1, 3, 2, 1, [unguibus binis], armati. [Pedes penultimi paris unguibus binis armati]. [Pedum analium coxae calcare singulo, parvo armatae].

Pedes postici breviusculi, crassiusculi.

Genitalium femineorum unguis sat manifesto trilobus, aculeis tenuibus, interioribus quam exterioribus paulo tenuioribus.

Long. 6.5 mm. (fem.) — 8 mm. (mas.).

LOCALITY.—New York City. (L. Lund).

TAIYUBIUS Chamberlin.

Can. ent., 1912, 44, p. 176.

Head with distinct lateral marginal interruptions.

Antennae short; articles twenty-eight to thirty-five.

Ocelli six to fourteen in three, or occasionally but two, series; single ocellus much largest.

Prosternal teeth 2 + 2 (or very rarely 3 + 3 in individual cases); line of apices recurved or, at most, straight. Spines long, distally bristle-like.

Posterior angles of the ninth, eleventh, and thirteenth dorsal plates produced.

Coxal pores circular; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods short; tripartite. First article with mesal side straight, not excavated mesally. Basal spines 2 + 2, or occasionally 3 + 3; conspicuously broad; usually widest at or near beginning of acuminate portion.

Tarsi of all legs divided.

Posterior legs of male without special modification.

Either none or the last one or two pairs of coxae laterally armed. Third joint of all legs, or of all but first pair, with two or three dorsal spines. Fifth joint of all legs between second to fourth and twelfth pairs with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 2, 1 to 0, 1, 3, 3, 0 and 0, 1, 3, 3, 1; claws two. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws 2 or 3. Dorsal spines of twelfth legs 0, 0, 3, 1, 2 or 0, 0, 3, 2, 2; ventral, 0, 0, 2, 3, 2 to 0, 0, 3, 2, 2. Dorsal spines of first legs 0, 0, 2, 2, 1 or rarely fewer; ventral 0, 0, 1, 2, 1 to 0, 0, 1, 3, 2.

Length 9 to 15 mm.

TYPE.—*T. angelus* Chamberlin.

This genus appears to be very close to *Paitobius*, the species of the two genera being much alike in habit, coloration, and general appearance. *Taiyubius* is to be distinguished through its having the line of apices of prosternal teeth recurved and through the broad basal spines

FIG. 5.—Distribution of *Taiyubius*.

of the gonopods in the females, these standing in conspicuous contrast to the slender ones uniformly present in *Paitobius*. *Taiyubius* is a prevailing western genus, all the species occurring west of the Rockies excepting *harriellae* which is found commonly in Colorado but also in New England (Figure 5).

Key to Species of Taiyubius.

- a. Each coxa of last one or two pairs of legs armed laterally with a spine.
 - b. Ventral spines of penult legs 1, 3, 3, 2; of the anal, 1, 3, 3, 1; articles of antennae mostly 34 or 35. *T. satanus* (Chamberlin).
 - bb. Ventral spines of penult legs 1, 3, 3, 1; of anal legs 1, 3, 3, 0; articles of antennae 28-32. *T. purpureus* (Chamberlin).
- aa. None of the posterior coxae laterally armed.
 - b. Third joint of about first nine pairs of legs with but two dorsal spines; ventral spines of second legs, 1, 3, 2; articles of antennae mostly 26 to 29. *T. angelus* (Chamberlin).
 - bb. Third joint of at most first three pairs of legs with two dorsal spines; others with 3; ventral spines of second legs 1, 2, 1; articles of antennae mostly 35 to 39.
 - T. harriellae* (Chamberlin).

TAIYUBIUS ANGELUS (Chamberlin).

Plate 5, fig. 4, 5.

Lithobius angelus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 155.

Taiyubius angelus Chamberlin, Can. ent., 1912, **43**, p. 176.

DESCRIPTION.—Dorsum light brown to chestnut, the most caudal plates and the head with the first plate darker. Head often paler in front of the suture. Antennae concolorous with the head, pale distad. Venter pale testaceous to brown, the caudal plates considerably darker and more reddish. Prosternum and prehensors reddish brown, the latter paler distad. Legs colored like corresponding plates of venter, the posterior pairs being thus darker, brown to chestnut, uniform or sometimes a little paler distad. The body is often suffused in deeper tissues with a violaceous pigment which is commonly most evident in venter.

Body considerably attenuated cephalad, with the tenth plate clearly wider than the eighth and than the head, and the first plate

narrower than the third. Body (in ♀) about 8 times longer than the width of the tenth plate. Width of head and of first, third, eighth, and tenth plates to each other as 40 : 36 : 37 : 42 : 45.

Head suborbicular, as long as wide or nearly so; widest at marginal breaks back of which the sides are convex and strongly converge, rounding about corners to the caudal margin which is nearly straight. Smooth and shining or under lens appearing very finely roughened over the middle portion. The usual median longitudinal sulcus beginning at a short transverse mark a little in front of the suture and extending cephalad. A wide, shallow longitudinal furrow each side of the middle running forward from the caudal margining sulcus. In some there is a more or less distinct transverse mark on each side a little ways caudad of the frontal suture. Hairs of moderate length, sparse.

Antennae short or very short, reaching only to the fifth or sixth segment. Articles twenty-six to twenty-nine, but in most twenty-eight, which, beyond the first few, are short and decrease distad. Hairs rather long, not dense.

Ocelli mostly ten or twelve in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 3; 1 + 5, 3, 3. Single ocellus much largest, subvertically oval. Ocelli distinct and series regular; the ocelli of first and second series largest, decreasing ventrad and cephalad.

Prosternum between 1.5 and 1.6 times wider than long. Distance between chitinous spots 4 times greater than length of the dental line and 2.25 times greater than width at level of bottom of mesal incision. Teeth 2 + 2, those of each pair close together, of moderate size, the mesal tooth on each side directed somewhat mesocephalad and its apex caudad of the line tangent to apices of outer teeth.

First dorsal plate smooth and shining like the head, under the microscope appearing very finely roughened; a transverse sulcus in front of caudal border usually continuous at each end with a longitudinal furrow parallel with the margin, while another longitudinal furrow may be more or less distinguishable each side of the median line. Other major plates also with a transverse caudal furrow and a lateral longitudinal furrow on each side together with a mostly more sharply impressed longitudinal furrow farther toward the middle, this diverging from the corresponding one of the other side caudad. Plates very finely rugose, becoming more distinctly roughened caudad.

First ventral plate with a median basin-like depression, while the others show more or less distinctly the usual three longitudinal furrows, these becoming more distinct in going caudad; showing usually also two wide transverse depressions or furrows, one anterior

and one, more distinct, caudal, with sometimes finer lines and transverse rugae in the interval between the two.

Coxal pores circular or slightly transversely elliptic: 4, 4, 4, 3; 5, 5, 5, 4; 5, 5, 5, 5; 5, 5, 6, 5; etc.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$; of the third, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the fourth to ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the tenth and eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$, claws two; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claws two. None of the coxae laterally armed.

Anal and penult legs short, moderately thickened, the femur and tibia weakly longitudinally sulcate above.

Gonopods of female of moderate size, but little or not at all extending beyond caudal end of the last dorsal plate. Claw tripartite, the lobes acute, with the median one but little longer than the others. Mesal edge of first joint nearly straight. Basal spines 2 + 2, conspicuously flattened above base, broad, widening distad to the beginning of the distal third of length from where narrowing to a point; edges often more or less minutely crenulate. Inner spine as usual, with broad surface set more or less at an angle with that of the outer one.

Length 13 to 15 mm. A female 13 mm. long has antennae 4.5 mm. long; anal legs 5 mm. long; width of tenth plate 1.6 mm.

TYPE LOCALITY.—California: Los Angeles.

Taken also in California at Oroville and Santa Barbara.

TAIYUBIUS SATANUS (Chamberlin).

Lithobius angelus satanus Chamberlin, Can. ent., 1911, **43**, p. 380.

Taiyubius satanus Chamberlin, Can. ent., 1912, **44**, p. 176.

DESCRIPTION.—Dorsum brown, the caudal margins of the anterior major plates darker. Head dark brown, paler in front of suture. Antennae dark brown proximally, becoming pale distad. Prosternum dark brown with the prehensorial feet paler, orange. Venter pale brown, darker caudad, the last several plates being distinctly darkest; the anterior plates suffused with violaceous. Legs similar to venter and in part showing a violaceous tint as in most species of *Paitobius*; posterior pairs darker excepting the last two pairs which are orange.

Body moderately attenuated cephalad; eighth and tenth plates nearly same in width, a little wider than head; first plate a little narrower than the third. Body in type (♂) not quite eight times

longer than width of tenth dorsal plate. Widths of head and of first, third, eighth, and tenth plates to each other as 34 : 31 : 32 : 36 : 36.

Head subrotund; wider than long (17 : 16). Widest near marginal interruptions, caudad of which the sides strongly converge. Caudal margin mesally incurved. Two longitudinal sulci which, beginning close together at caudal margining sulcus, diverge cephalad and end abruptly a little caudad of the frontal suture. A transverse furrow is indicated a little in front of and parallel with the suture with the usual longitudinal median sulcus extending forward from it. Finely roughened. Hairs of moderate length, sparse.

Antennae short; composed of about thirty-four or thirty-five compactly arranged articles of which the second is largest and those distad of the third short and very short. Hairs moderately long and sub-sparse.

Ocelli six to nine in two or three series: *e. g.*, 1 + 3, 2; 1 + 3, 3, 1; 1 + 3, 3, 2.

Prosternum between 1.6 and 1.7 times wider than long. Distance between chitinous spots three times the length of dental line and 2+ times greater than width at level of bottom of median incision. Median incision semicircular. Teeth large, acute.

Excepting the first one, the dorsal plates are rather distinctly and considerably rugose. Each major plate with a median longitudinal sulcus which is most distinct caudad; on each side a longitudinal sulcus diverges from the median one caudad, while caudad of its posterior end a shorter, sharply impressed one converges toward the corresponding one of the opposite side; farther ectad on each side a longitudinal sulcus extends parallel with margin for entire length of plate.

Ventral plates with the usual three longitudinal sulci of which the median one is usually continuous entirely across the plate and is the most distinct, especially caudad. Anterior plates usually transversely broadly depressed.

Coxal pores small, circular: 3, 3, 3, 2; 3, 3, 3, 3.

Spines of first legs, $\frac{0, 0, 1(2), 1, 1}{0, 0, 0, 1, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 1, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 1, 1}$; of the third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 1, 1}$; of the fourth, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 1, 2}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 2}$; of the fifth to ninth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$; of the tenth and eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 2, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; of the twelfth, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$, the anterior dorsal spine of the last two articles minute; of the thirteenth, $\frac{1, 0, 3, 1, 2}{0, 1, 3, 3, 2}$ (left) or $\frac{1, 0, 3, 2, 1}{0, 1, 3, 3, 2}$ (right); of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws two. Last two pairs of coxae laterally armed.

Posterior legs slender, of moderate length. In both anal and

penult pairs the prefemur, femur, and tibia are longitudinally weakly furrowed above.

Gonopods of ♂ clearly extended; narrow, distally rounded; pale.

Length near 10 mm. In the male type, which is 10 mm. long, the antennae are 3.8 mm. long, the anal legs 4.4 mm. long, and the tenth plate 1.25 mm. wide

Praematurus.—Coloration as in adult.

Antennae very short. Articles twenty-eight (left) — thirty-four (right), the two antennae differing in length correspondingly.

Ocelli 1 + 3, 2. Single ocellus largest, the most caudal one of upper series next; ocelli of lower row smallest.

Prosternal teeth 3 + 3, a small extra one being present at edge of incision on each side, the other two of usual proportions.

Coxal pores small: 3, 3, 3, 2.

Spines of first legs, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 0, 1}$; of the second, $\frac{0, 0, 0, 2(1), 1}{0, 0, 0, 1, 1}$; of the third, $\frac{0, 0, 0, 2, 1}{0, 0, 0, 1, 1}$; of the fourth and fifth, $\frac{0, 0, 1, 2, 1}{0, 0, 0, 1, 1}$; of the sixth, $\frac{0, 0, 1, 2, 1(2)}{0, 0, 0, 2, 1}$; of the seventh, $\frac{0, 0, 1, 2, 2}{0, 0, 1, 2, 1}$; of the eighth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the twelfth, $\frac{0, 0, 2, 1, 2}{0, 0, 2, 2, 2}$ or $\frac{0, 0, 3, 1, 2}{0, 0, 2, 2, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 2}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 0}$, claws two. Last two coxae laterally armed.

Gonopods of ♂ projecting caudad beyond sternite as a pale conical process.

Length 9 mm.

TYPE LOCALITY.—California: Oakland.

TAIYUBIUS HARRIELAE (Chamberlin).

Plate 5, fig. 6.

Lithobius harriellae Chamberlin, Proc. Acad. nat. sci. Phil., 1906, p. 3; Ann. Ent. soc. Amer. 1909, 2, p. 191.

Taiyubius harriellae Chamberlin, Can. ent., 1912, 44, p. 176.

DESCRIPTION.—Dorsum light brown or testaceous, with a broad median longitudinal dark stripe extending the entire length or sometimes evident only over caudal portion. Head testaceous, blackish or dusky in eye-region and sometimes in a curved band along the frontal suture. Antennae testaceous or yellowish. Prosternum and prehensors yellow or testaceous. Venter yellow, a few of the most caudal plates darker. Legs light yellow, with the caudal pairs somewhat darker, sometimes dark brown or blackish on ectal surface especially the joints proximad of tarsi.

Body moderately narrowed cephalad, the tenth plate being clearly wider than the head and slightly wider than the eighth plate. Third plate a little wider than the first. Length, in type, 7.5 times greater than width of tenth plate. Widths of head and of first, third, eighth, and tenth plates to each other as 40 : 35 : 36 : 45 : 46.

Head subcordate; wider than long in ratio 17 : 16, or sometimes equal in length and breadth. Caudal margin straight or but slightly incurved. A transverse furrow more or less evident caudad of the frontal suture, the furrow or branches from it usually angularly bent caudad at the middle. The usual median longitudinal sulcus in front of the suture, this sulcus commonly double with the parts diverging cephalad. A median longitudinal furrow on caudal portion of head while from one to three curved furrows may be traced more or less clearly on each side of it.

Antennae short; composed of from thirty-three to forty-one articles of which those between the third or fourth and ultimate are short and very short and closely compacted. Hairs of moderate length, not dense.

Ocelli ten to fourteen in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 3; 1 + 5, 4, 3. Single ocellus much the largest, vertically oval. The most caudal ocellus of top series largest of the seriate ocelli.

Prosternum 1.5, or a little more or less, times wider than long. Distance between chitinous spots 2.4 times width at level of bottom of mesal incision; from 4 to 4.5 times the dental line. Teeth 2 + 2, small, line of apices clearly recurved. Margin ectad of teeth convexly rounding ectad and then caudad as usual.

First dorsal plate 1.8 times wider than long. Plates only very finely roughened, to the naked eye appearing nearly smooth and shining, especially so the first one. There may usually be traced on the major plates a longitudinal furrow on each side diverging from the median line caudad, with sometimes traces of a median longitudinal furrow; in some a second longitudinal furrow is evident ectad of the one first mentioned and toward which it converges caudad.

Ventral plates without conspicuous markings, to the naked eye usually appearing smooth and shining.

Coxal pores small and very small: 3, 4, 4, 3; 3, 4, 5, 3; 4, 5, 5, 3; 4, 5, 5, 4; 4, 4, 5, 4; 4, 6, 6, 5; etc.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the fourth and fifth, $\begin{smallmatrix} 0, 0, 1, 3, 1 \\ 0, 0, 3, 1, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the sixth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 1, 1 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 1, 3, 1, 1 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 0, 0, 3, 3, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$; of the penult,

$\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 1, 3, 3, 1; \end{smallmatrix}$ claws two; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0; \end{smallmatrix}$ claws two. None of the coxae laterally armed.

Claw of female gonopods of moderate size, rather wide, tripartite; lobes acute, the median one not much exceeding the lateral ones. Basal spines $2 + 2$ or, exceptionally $3 + 3$, the innermost spine on each side in the latter case being much the smallest of the three; spines very broad, widest toward middle of length, acutely pointed, shaped somewhat like a broad arrow-head.

Gonopods of male clearly exposed; subtruncate distally.

Length mostly 10 to 12 mm.

TYPE LOCALITY.—Colorado: east of Glenwood Springs.

Taken also in Colorado at Salina and in Massachusetts at Cambridge and Mattapan.

TAIYUBIUS PURPUREUS (Chamberlin).

Lithobius purpureus Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 24.

Taiyubius purpureus Chamberlin, Can. ent., 1912, **44**, p. 176.

The original description of the types, rearranged, follows:—

Color dark purple-brown, the purple tint often conspicuous and unmixed. Head and legs yellowish brown, the tarsal joints of the last pairs of legs commonly lighter; antennae dark, yellow or rufous at ends.

Antennae composed of from twenty-eight to thirty-two, articles which, excepting the first few, are short or very short; length 2.3–3 mm.

Ocelli mostly twelve or thirteen.

Prosternal teeth normally $2 + 2$, rather large and pale (rarely the teeth may be doubled).

Coxal pores small or moderate: 2, 3, 3, 2; 3, 4, 4, 3.

Ventral spines of first legs 0, 0, 0, 0, 1; of the penult, 0, 1, 3, 3, 1; of the anal, 0, 1, 3, 3, 0 (or, rarely, 0, 1, 3, 1, 0). Posterior coxae laterally armed.

Claws of female gonopods rather long, tripartite, the lobes acute, with the median longest and the outer one smallest, sometimes near base and inconspicuous. Basal spines short and broad, widest at middle.

Length 7 to 8.5 mm. Length of anal legs 3–3.3 mm.; of antennae 2.3–3 mm.

TYPE LOCALITY.—Utah: Salt Lake City.

The types (U. S. N. M. 786) were found under sticks, boards, and logs laid on fine loose soil in and near growths of willows on the banks of the Jordan River.

SONIBIUS Chamberlin.

Can. ent., 1912, 44, p. 176.

Head with distinct lateral marginal interruptions.

Antennae short; articles normally twenty.

Ocelli present; seriate; single ocellus enlarged.

Prosternal teeth 2 + 2 or 3 + 3; spines slender.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly produced.

Coxal pores circular or slightly elliptic; uniseriate.

Gonopods of male uniarticulate.

Claw of female gonopods short; tripartite, with median lobe not much longest. Spines 2 + 2; short and relatively very wide.

Tarsi of anterior legs divided.

Posterior legs of male without special lobes or modifications. Third joint of all legs caudad of first or second pair with three dorsal spines or those cephalad of sixth with but two. Fifth joint of legs between third or fourth and twelfth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claws two or three. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 1 or 0, 1, 3, 3, 2; claws two or three. Dorsal spines of twelfth legs 1, 0, 3, 1, 1 to 1, 0, 3, 2, 2; ventral, 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 1, 1, 1 to 0, 0, 2, 2, 1; ventral, 0, 0, 1, 3, 1 and 0, 0, 1, 3, 2 to 0, 0, 1, 2, 1 and 0, 0, 0, 2, 1.

Last two or three pairs of coxae laterally armed.

Length 8–12.5 mm.

TYPE.—*S. bius* (Chamberlin).

This genus seems to be very close to *Nadabius* but differs from it especially in the strongly produced angles of the ninth, eleventh, and thirteenth dorsal plates and in lacking a tibial crest in the anal legs of the male. It has thus far been found only in the section of the United States east of the Mississippi River and north of the Ohio River (Figure 6).

Key to Species of Sonibius.

a. Anal legs bearing 3 distinct claws.

b. Dorsal spines of twelfth legs 1, 0, 3, 2, 2; prosternal teeth 3 + 3; length of type, ♂, 12.5 mm.). . *S. bius* (Chamberlin).

FIG. 6.—Distribution of *Sonibius*.

- bb.* Dorsal spines of twelfth legs 1, 0, 3, 1, 1; prosternal teeth 2 + 2; length 8.5–9.5 mm. *S. parrus*, sp. nov.
- aa.* Anal legs bearing only 2 distinct claws.
- b.* Penult legs with but 1 accessory claw; ventral spines of penult legs, normally 0, 1, 3, 3, 1. *S. politus* (McNeil).
- bb.* Penult legs with 2 accessory claws; ventral spines of penult legs normally 0, 1, 3, 3, 2. *S. numius* (Chamberlin).

SONIBIUS BIUS (Chamberlin).

Lithobius bius Chamberlin, Can. ent., 1911, **43**, p. 102.

Sonibius bius Chamberlin, Can. ent., 1912, **44**, p. 177; 1914, **46**, p. 302.

DESCRIPTION.—Dorsum uniform brown. The head a little darker, with the antennae similar but becoming pale distad. Prosternum like head, the prehensors paler. Venter testaceous, the posterior plates darker. Legs light brown or testaceous dorsally, ventrally paler; caudal pairs dark proximally but distal articles yellowish or light orange.

Body rather robust, being not quite seven times as long as width of eighth and tenth plates which are equal in width. Conspicuously narrowed cephalad, with first plate narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 46 : 40 : 42 : 52 : 52.

Head wider than long in about ratio 23 : 21. Subrotund, the sides caudally strongly rounded. Caudal margin distinctly incurved mesally. Smooth and shining.

Antennae short, reaching fifth or sixth segment. Articles twenty (left) — twenty-three (right), moderately long, cylindric, decreasing distad. In the antenna with twenty-three articles the distal ones are proportionately shorter.

Ocelli twenty-two in five series: 1 + 5, 6, 5, 5; 1 + 5, 6, 5, 3, 2.

Prosternum 1.5+ times wider than long. Distance between chitinous spots two times, or a little more, greater than width at level of bottom of median incision; about 3.7 times the dental line. Teeth 3 + 3; acute; subequal.

Dorsal plates smooth and shining. Posterior angles of ninth, eleventh, and thirteenth acutely and strongly produced.

Ventral plates sparsely hirsute; the more caudal ones very finely roughened. Longitudinal furrows mostly obscure. A wide, shallow, transverse furrow showing in some on caudal portion.

Coxal pores small, circular: 4, 4, 5, 3; 4, 6, 5, 4.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the fourth to ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the eleventh and twelfth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 1, 0, 3, 2, 0 \end{smallmatrix}$, claws three. Last three pairs of coxae laterally armed.

Anal legs in male short, the femur very moderately thickened, complanate and longitudinally shallowly furrowed above; the tibia more slender; femur shallowly longitudinally furrowed above.

Gonopods of male but little exposed; broad and short.

Length of type (♂) 12.5 mm.

TYPE LOCALITY.—Michigan: Saunders.

Taken also at Douglas Lake, Mich.

SONIBIUS PARVUS, sp. nov.

Plate 6, fig. 5.

DESCRIPTION.—Dorsum brown with first dorsal plate typically darker. Head darker, dusky brown, either with or without a dilute chestnut tinge. Antennae dark brown proximally, becoming orange or rufous at tips. Prosternum and prehensors testaceous. Venter light brown, the caudal plates darker. Legs of nearly same color as the corresponding ventral plates, the last pair thus darkest but tarsi of these orange or rufous.

Body proportionately broad, being usually only about 6.25 times longer than width of tenth plate. Strongly narrowed cephalad. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 49 : 44 : 48 : 58 : 60 : 60.

Head somewhat wider than long (49 : 46).

Antennae short, the articles between the first few and the ultimate very short and closely united. Ultimate longer than the two preceding together.

Ocelli twelve to seventeen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 5, 5, 4, 2; 1 + 5, 4, 3, 1. Single ocellus considerably largest. Organ of Tömösvary in usual position, of about same size in outline as the smaller ocelli.

Prosternum with incision rather large, strictly v-shaped. Teeth equal or nearly so, small. Spine of usual form and in usual position. Sides of anterior portion of prosternum straight or nearly so from spine caudoectad, not convexly rounding out as more usual in the genus;

$1\frac{2}{3}$ times wider than long. Distance between chitinous spots in type 2.6 times width at level of bottom of incision; $3.55+$ times dental line.

First dorsal plate with sides moderately convex and caudally converging; 1.8 times wider than long. Posterior angles of ninth, eleventh, and thirteenth dorsal plates strongly acutely produced, while in fully grown individuals the posterior angles of the seventh and also of the sixth may also be very weakly extended.

Coxal pores small: 3, 4, 4, 3; 3, 4, 4, 4.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the fourth, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the fifth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the seventh to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, the claws three. Last two pairs of coxae laterally armed.

Claw of female gonopods short; moderately curved; tripartite; median lobe somewhat longest, the lateral ones subequal and at same level or nearly so, all acute. Outer basal spine considerably larger than the inner one, broad and short, the sides subparallel from base to beginning of apical division which is very acute, denticulate on each side at base of apical portion and sometimes proximad of it. Inner spine in ventral view similar in shape but proportionately narrower (Plate 6, fig. 5).

Length 8.5 to 9.5 mm.

TYPE.—M. C. Z., No. 146. Vermont: Grout's Mill, near Mt. Stratton.

Taken also in New York at Big Tupper Lake, St. Lawrence county, Thomas and F. K. Barbour.

SONIBIUS POLITUS (McNeill).

Lithobius politus McNeill, Proc. U. S. N. M., 1887, 10, p. 261. Chamberlin, Can. ent., 1911, 43, p. 103.

Lithobius howei Bollman (ad. part max.), Proc. U. S. N. M., 1889, 11, p. 409.

Sonibius politus Chamberlin, Can. ent., 1912, 44, p. 177; 1920, 52, p. 95.

DESCRIPTION.—Dorsum brown, uniform or nearly so. Head either nearly same as dorsum or considerably darker. Antennae brown, having often a reddish or purplish tinge proximally, paler distad; in one specimen the first article is very much lighter than those immediately succeeding. Venter testaceous, the anterior plates almost clear yellow. Prosternum testaceous, the prehensors paler.

Legs like corresponding parts of venter, caudal pairs a little darker proximally but dilute orange distally.

Body proportionately rather wide being mostly about 7 times longer than the width of the tenth plate. Body moderately narrowed cephalad and the first plate clearly narrower than the third. Widths of head and of first, third, eighth, and tenth plates to each other as 37 : 35 : 37 : 43 : 43.

Head wider than long in nearly ratio 14 : 13. Sides caudad of eyes nearly straight excepting in front of caudal corners, where more convex. Caudal margin mesally incurved. Marginal breaks not especially conspicuous. Smooth and shining.

Antennae short, reaching in most only to the fifth or to edge of sixth segment. Articles twenty, mostly short, decreasing distad gradually, or, in some, those distad of the first six to eight abruptly shorter.

Ocelli fifteen to twenty in mostly four series: *e.g.*, 1 + 2, 3, 4, 5; 1 + 5, 5, 3, 2. Single ocellus much the largest, oval.

Prosternum 1.5 times wider than long. Distance between chitinous spots 3.7 to a little less than 4 times the dental line; between 2.5 and 2.7 times width at level of bottom of mesal incision. Sides of anterior portion slanting almost directly from outer teeth. Teeth small, acute, with line of apices conspicuously reentrant; 2 + 2 or 3 + 3, in the latter case the most mesal tooth on each side commonly very small.

Dorsal plates smooth and shining. Hairs short and sparse, more numerous on caudal plates.

Ventral plates appearing smooth and shining, or under lens some are seen to be finely roughened, especially the more caudal ones. Hairs more numerous caudad.

Coxal pores of medium size, circular or slightly transversely elliptic: 4, 6, 6, 5; 4, 6, 6, 6; 5, 6, 6, 6; 4, 5, 5, 4.

Spines of first legs, $\frac{0, 0, 1, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 1, 2, 1}{0, 0, 1, 3, 2}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$ or $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 2}$; of the third, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$; of the fourth to tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$; claws three, of which the anterior accessory is very small; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$ or $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 1}$, claws two or a third represented by an obsolete point. Last two or three pairs of coxae laterally armed.

Posterior legs of male short and slender; the tibia and femur of both anal and penult pair shallowly longitudinally furrowed above.

Gonopods of male exposed as moderately large rounded or hemispherical eminences bearing two or three bristles.

Gonopods of female considerably exceeded by dorsal plate of anal segment. Claw short and relatively wide; tripartite; the lobes short and the median not much longer than the others. Basal spines short and proportionately very wide, with sides subparallel to the distal third or fourth which is acuminate with apical angle low or obtuse.

Length 8 to 11 mm.

TYPE LOCALITY.—Indiana: Dublin.

Taken also in Indiana: at Bloomington, Kokomo (Bollman coll.). Michigan: Ludington. Illinois: Peoria. Ontario, Ottawa, Quebec.

Mr. Bollman appears undoubtedly to have applied his name *Lithobius howei* to two entirely different species. The type of *howei* is a male from Fort Snelling, Minn., and an examination of this shows it to be closely related to, and possibly identical with, *L. mordax* and to differ widely from the present species. In Bollman's second and somewhat fuller account of the species (Proc. U. S. N. M., 1887, 10, p. 255 and 258) he gives the anal legs as having but one claw, with ventral spines 1, 3, 3, 1 and length 7 mm.; ventral spines of first legs 2, 3, 2; ocelli 25 in number; total length 15 mm., etc.; all of which points separate it clearly from *politus*; *politus* is first described in this same paper under the heading *Lithobius politus* McNeill MSS., and is reported from Dublin and Bloomington, Indiana, and from Ludington, Mich. However, in Mr. Bollman's Catalogue of the Myriopods of Indiana" (Proc. U. S. N. M., 1888, 11) and in his posthumous Catalogue of North American Myriapoda, *politus* is not mentioned, while *howei* is listed from Dublin, Bloomington, and Kokomo. An examination of the specimens from these localities in Mr. Bollman's collection labeled as *L. howei* show them to be the same as *politus*. It is thus evident that Mr. Bollman intended to drop *politus* as a synonym of *howei*; but that the two species are widely different is evident from the original descriptions, even though the presumed type of *howei* in the National Museum, which does not agree wholly with the description, might be regarded as possibly incorrectly labeled.

SONIBIUS NUMIUS (Chamberlin).

Lithobius numius Chamberlin, Can. ent., 1911, 43, p. 102.

Sonibius numius Chamberlin, Can. ent., 1912, 44, p. 177.

DESCRIPTION.—Dorsum nearly uniform brown. Head darker. Antennae brown or reddish brown proximally, paler distad. Venter testaceous. Caudal legs dilute orange distad.

Body in type seven times longer than width of tenth plate; more strongly narrowed cephalad than in *politus*. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 36 : 33 : 35 : 43 : 43.

Head considerably wider than long (12 : 11); broadly subcordate; caudal margin mesally distinctly incurved.

Antennae short, reaching the fifth segment. Articles of moderate length, decreasing regularly distad. Hairs of moderate length, subdense.

Ocelli twenty to twenty-three in five series: *e.g.*, 1 + 2, 5, 5, 5, 4; 1 + 3, 5, 5, 4, 2. Single ocellus oval, large.

Prosternum about 1.5 times, or a little more, wider than long. Distance between chitinous spots 2.8 times width at level of bottom of incision, a little less than 4.5 times as great as the dental line. Teeth 2 + 2, small, acute, the line of apices reentrant. Spine almost contiguous with ectal tooth, bristle-like.

Coxal pores in type: 4, 6, 6, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the fourth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the fifth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claws two. Last two pairs of coxae laterally armed.

Claw of female gonopods short; tripartite; lobes short with the median but little longer than the others. Spines broad; sides subparallel or a little diverging to acuminate apical portion, outer longer than inner; larger than in *politus*.

Length of type (♀) 10.5 mm.

TYPE LOCALITY.—Wisconsin: Haugen.

Very close to the preceding species and may possibly prove to be only a variety of it.

NADABIUS Chamberlin.

Bull. M. C. Z., 1913, 57, p. 62.

Head with distinct marginal breaks.

Antennae short or very short; articles nineteen to twenty-three, but normally twenty.

Eye consisting of ocelli arranged in from three to five series; single ocellus enlarged.

Prosternal teeth 2 + 2, or occasionally 3 + 3 and 4 + 4; line of apices more or less recurved.

Posterior angles of none of the dorsal plates produced or those of eleventh and thirteenth weakly so.

Coxal pores circular; uniseriate: 3, 4, 4, 3 to 5, 6, 6, 5.

Gonopods of male uniarticulate; bearing from two to four long bristles.

Claw of female gonopods tripartite, or rarely entire by obliteration of lateral teeth. Basal spines 2 + 2, typically short and rather broad with sides proximad of apical acuminate portion subparallel or slightly diverging from base distad. First article of gonopod not excavated proximally.

Tarsi of all legs divided.

In the male the anal legs are short and but little thickened; dorsally longitudinally more or less sulcate; the fifth joint bearing a characteristic low crest at the distal end mesad of median line, the crest bearing a variable number of hairs, usually of special type.

Last one to three pairs of coxae laterally armed. Third joint of all legs caudad of second with either two or three dorsal spines, the number bearing two variable. Fifth joint of all legs between first or second and twelfth with two dorsal spines. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1 to 0, 1, 3, 2, 0; claws 1 or 2. Dorsal spines of penult legs 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; claws three or, less commonly, two. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or 1, 0, 3, 2, 2; ventral 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or rarely only 1, 0, 3, 1, 1, the coxal spine sometimes missing; ventral 0, 0, 3, 3, 2 or 0, 0, 2, 3, 2. Dorsal spines of eleventh legs 0, 0, 3, 2, 2; ventral 0, 0, 2, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of first legs 0, 0, 2, 2, 1 to 0, 0, 3, 2, 1 and 0, 0, 3, 2, 2; ventral 0, 0, 1, 2, 1 to 0, 0, 2, 3, 2.

Length 7 to 16 mm. but mostly above 10 mm.

TYPE.—*N. iowensis* (Meinert).

The species of *Nadabius* are for the greater part of medium size, prevailing brown or chestnut in color with the head darker. In the north central states they are the most abundant in individuals of the Lithobiidae.

Key to Species of Nadabius.

- a. Anal leg with 2 distinct claws.
 - b. Dorsal spines of thirteenth legs 1, 0, 3, 2, 2; only the last pair of coxae laterally armed.
 - c. Prosternal teeth 2 + 2; ventral spines of anal legs normally 0, 1, 3, 3, 0.....*N. pullus* (Bollman).

FIG. 7.— Distribution of *Nadabius*.

- cc. Prosternal teeth 4 + 4 or sometimes 3 + 3; ventral spines of anal legs normally 0, 1, 3, 3, 1... *N. aristeus*, sp. nov.
- bb. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1; last 2 pairs of coxae laterally armed.
- c. Ventral spines of anal legs 0, 1, 3, 2, 0; dorsal spines of twelfth legs 0, 0, 3, 1, 1... *N. oreinus*, sp. nov.
- cc. Ventral spines of anal legs 0, 1, 3, 3, 0 or 0, 1, 3, 3, 1; dorsal spines of twelfth legs 1, 0, 3, 1, 2 or 0, 0, 3, 1, 2.
N. coloradensis (Cockerell).
- aa. Anal leg with but 1 claw.
- b. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1.
- c. Dorsal spines of twelfth legs 1, 0, 3, 1, 1.
N. mesechinus (Chamberlin).
- cc. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 to 0, 0, 3, 2, 2 and 0, 0, 3, 1, 2.
- d. Prosternal teeth 3 + 3 or 4 + 4... *N. iowensis* (Meinert).
- dd. Prosternal teeth 2 + 2 or rarely 2 + 3.
N. eigenmanni (Bollman).
- bb. Dorsal spines of thirteenth legs, 1, 0, 3, 2, 2.
N. holzingeri (Bollman).

NADABIUS ARISTEUS, sp. nov.

Plate 6, fig. 3, 4.

DESCRIPTION.—Dorsum brown; a darker median longitudinal stripe more or less evident. Head and first dorsal plate much darker, almost black. Antennae very dark, brown to blackish, proximally, becoming paler and more or less rufous distally. Prosternum like head; prehensors rufous distally. Venter light brown or testaceous, darker caudally. Legs light brown, caudal pairs somewhat darker.

Body robust only 6 to 7 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth dorsal plates to each other as 90 : 78 : 83 : 102 : 101 : 98.

Head subcordate, widest at level of breaks which are pronounced and rectangular. Wider than long in about ratio 15 : 14.

Antennae moderately short. Articles twenty to twenty-one; of intermediate length, subcylindric, decreasing distad. Ultimate article shorter than the two preceding taken together.

Ocelli twelve to eighteen in three or four series: *e.g.*, 1 + 4, 4, 3; 1 + 4, 3, 3, 1; 1 + 4, 4, 4, 3; 1 + 4, 5, 4, 3. Single ocellus clearly

exceeding any other in size, or in largest specimens not greatly differing from most caudal ocellus of dorsal series.

Prosternal teeth 4 + 4, rarely 3 + 3, acute, the most mesal on each side smallest. Incision small, between v- and u-shaped. Spine slenderly acuminate (Plate 6, fig. 4). In type 1.6 times wider than long. Distance between chitinous spots 2 times width at level of bottom of median incision; 2.8 times the dental line.

First dorsal plate widest anteriorly; sides convex, converging moderately caudad; 1.7—times wider than long. Posterior corners of ninth plate rectangular or a little rounded; those of the eleventh a little produced, those of the thirteenth more strongly so.

Coxal pores: 4, 5, 5, 5; circular or in part transversely subelliptic.

Spines of first legs, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$ or $\frac{0, 0, 1, 1, 1}{0, 0, 1, 2, 1}$; of the second, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the third, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ to $\frac{0, 0, 2, 1, 2}{0, 0, 1, 3, 2}$; of the fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 2}$; of the seventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eighth and ninth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the eleventh and twelfth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or occasionally $\frac{1, 0, 3, 1, 1}{0, 1, 4, 3, 2}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$, claws two. Anal coxae laterally armed.

Tibia of anal leg in male with a sharp edged dorsal longitudinal ridge showing at its distal end the usual crest which is low and not much elevated distad.

Gonopods of male distinctly exposed; distally rounded; bearing two bristles.

Claw of female gonopods short and broad, tripartite, with the median not much larger in size than the dorsal, these two bluntly rounded and short, the ventral tooth smaller and more proximal in position. Spines proportionately very short, broad, but little narrowed from base to distal division which is short and apically rounded.

Length 11 to 16 mm. A male 11.5 mm. long has antennae 4 mm. and anal leg 4.2 mm., with tenth plate cir. 1.9 mm. wide.

Praematurus.—Coloration as in *maturus*, or a little lighter throughout.

Antennae short; articles twenty (on one side in one specimen only seventeen).

Ocelli 1 + 4, 3, 3; 1 + 4, 4, 3. Relations as in adult.

Prosternal teeth small 3 + 3. Incision widely v-shaped.

Coxal pores: 3, 4, 4, 3; very small.

Claw of female gonopods very short, thin, bilobed or trilobed with the outer lobe very small and the inner lobe blunt. Spines 2 + 2, but the inner one of each pair minute, appearing, in specimens de-

scribed, as a mere point; the outer spine already rather robust though proportionately more slender than in the adult.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 1, 1}$; of the second and third, $\frac{0, 0, 2, 2, 1}{0, 0, 2, 2, 1}$; of the fourth and fifth, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 1}$; of the sixth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 3, 1}$. Last pair of coxae laterally armed.

Length 10–11 mm. (Ithaca, N. Y.).

TYPE.—M. C. Z., No. 247, New Jersey: Macapin, November, 1913 (J. H. Emerton).

Taken also in New York at Ithaca, and in Massachusetts at Worcester.

NADABIUS PULLUS (Bollman).

Plate 7, fig. 1–3.

Lithobius pullus Bollman, Amer. nat. 1887, **21**, p. 81. Proc. U. S. N. M., 1887, **10**, p. 257. 1888, **11**, p. 409. Bull. 46, U. S. N. M., 1893, p. 19, 21, 24, 110, 134. Chamberlin, Can. ent., 1911, **43**, p. 103.

Lithobius elattus Bollman, Proc. U. S. N. M., 1889, **11**, p. 348. Chamberlin, Ann. Ent. soc. Amer., 1911, **4**, p. 40.

DESCRIPTION.—Dorsum brown. Head darker, mostly somewhat chestnut. Prosternum dark brown, the prehensors lighter. Venter paler than dorsum. Legs similar to venter; posterior pairs light distally as usual.

Body in types described 7.66 to 8 times longer than width of teeth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 33 : 29 : 31 : 39 : 39 : 37.

Head precisely equal in length and breadth, or very nearly so. Lateral margin a little incurved midway between break and caudal corner, the latter widely rounded.

Antennae short or very short, commonly reaching only upon fifth body segment. Articles normally twenty, these moderately short.

Ocelli mostly near ten or eleven in three or four series: *e. g.*, 1 + 4, 3, 2; 1 + 4, 3, 3; and 1 + 4, 3, 2, 1, a common arrangement. Eye-patch subtriangular, with apex ventrad. Of the seriate ocelli the first one of the top series is largest as usual, the others not much differing in size excepting the most ventral, which may be considerably reduced.

Prosternal teeth 2 + 2, of moderate size, equal, acute. Spine long, stout at base but distally slender and acute. In type measured, prosternum is 1.52 times wider than long. Distance between chitin-

ous spots 2.2— times width at level of bottom of median incision and 3.7 times the dental line.

First dorsal plate 1.65 times wider than long. Posterior angles of none of the dorsal plates at all produced.

Coxal pores rather small, circular: 3, 4, 4, 3; 4, 5, 5, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1, \\ 0, 0, 1, 2, 1, \end{smallmatrix}$ of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1; \end{smallmatrix}$ of the third to seventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2; \end{smallmatrix}$ of the eighth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2; \end{smallmatrix}$ of the ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2; \end{smallmatrix}$ of the tenth to twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2; \end{smallmatrix}$ of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2; \end{smallmatrix}$ of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2; \end{smallmatrix}$ claws two, with the accessory one large; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0; \end{smallmatrix}$ very rarely $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0; \end{smallmatrix}$ claws two. Last pair of coxae laterally armed.

Anal leg of male short, moderately thickened; fifth joint at distal end on dorsal surface and toward mesal side with a low keel-like crest which is most elevated distad; third, fourth especially, and the fifth joints longitudinally furrowed dorsally. In the female the last two pairs of legs are enlarged and furrowed as in the male but the anal pair lack the crest on fifth joint.

Gonopods of male cuneate; each bearing three long bristles.

Claw of female gonopods short and broad; distinctly tripartite, with the middle lobe longer and more acute than the lateral. Basal spines short and relatively very broad; distally acutely rounded; inner spine a little smaller than the outer, its principal plane set almost at right angles to that of the outer and its edge being thus presented ventrad.

Length 9–12 mm. a male 11.5 mm. long, has antenna 5 mm. long, anal leg 3.6 mm. long, and tenth plate 1.4+ mm. wide.

TYPE LOCALITY.—Indiana: Bloomington.

Taken also in Illinois at Dwight. Tennessee: Johnson City, Russellville. Virginia: Chatham, Lynchburg, Natural Bridge, Balcony Falls, Marksville. West Virginia: White Sulphur. D. C.: Washington.

The description above is based chiefly upon a pair of the cotypes from Bloomington.

NADABIUS OREINUS, sp. nov.

Plate 5, fig. 7; Plate 6, fig. 1.

DESCRIPTION.—Brown. The head in front of suture paler. Antennae brown, yellow at tips. Prosternum brown, preensors yellowish. Venter pale, of very dilute olivaceous cast, the last several plates much darker. Legs yellowish.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 65 : 59 : 60 : 70 : 72 : 69.

Head subcordate, conspicuously narrowed forward from a little behind eyes. Marginal breaks distinct but oblique. Wider than long in about ratio 65 : 60.

Antennae short. The first four or five articles rather long, the others gradually decreasing in length distad. Ultimate article longer than the two preceding together.

Ocelli in type fifteen or sixteen in three series: thus, 1 + 6, 5, 3; 1 + 6, 5, 4. Single ocellus largest, subelliptic.

Prosternum 1.62 times wider than long. Distance between chitinous spots 2.47 times width at level of bottom of sinus; $4\frac{1}{3}$ times the dental line. Sinus narrowly v-shaped. Line of apices of teeth nearly straight, the inner tooth being a little larger than the outer. Spine long and slender, bristle-like distally. Sides ectad of bristle convex.

First dorsal plate only slightly narrowed caudad, the posterior corners strongly rounded as usual; caudal margin mesally incurved; 1.68 times wider than long. Caudal margin of ninth plate straight or with ends slightly bent caudad. Posterior angles of eleventh and thirteenth dorsal plates weakly produced.

Coxal pores: 3, 4, 4, 4-4, 4, 4, 4.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1; \\ 0, 0, 1, 3, 1; \end{smallmatrix}$ of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1; \\ 0, 0, 1, 3, 2; \end{smallmatrix}$ of the third to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2; \\ 0, 0, 2, 3, 2; \end{smallmatrix}$ of the twelfth, $\begin{smallmatrix} 0, 0, 3, 1, 1; \\ 0, 0, 3, 3, 2; \end{smallmatrix}$ of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1; \\ 0, 1, 3, 3, 2; \end{smallmatrix}$ of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1; \\ 0, 1, 3, 3, 2; \end{smallmatrix}$ claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0; \\ 0, 1, 3, 2, 0; \end{smallmatrix}$ claws two. Last two pairs of coxae laterally armed.

Claw of female gonopods short and broad; tripartite, teeth distinct and acute, sometimes a fourth tooth present on mesal side. Basal spines relatively short and very broad; in ventral view the outer one is considerably broadest, widening from base to the acutely acuminate distal portion (Plate 6, fig. 1).

Immaturus.—Very pale, the head with the antennae and several most caudal plates yellowish. Posterior legs dorsally nearly white.

Antennae already with the twenty articles present, those between the third and the ultimate relatively shorter than in the *maturus*.

Ocelli 1 + 3, 3, pale. Single ocellus a little larger than the most caudal one of upper series. Seriate ocelli conspicuously decreasing in size cephalad.

Prosternum as in adult.

Coxal pores 2, 2, 3, 2.

Gonopods of female short. The three articles developed. Claw appearing as a slender spine-like chitinous process which is entire

and slightly curved at tip. Distal article bearing a single ventral bristle, the second article two, and the first also two. Spines 1 + 1; moderately wide proximally, acuminate from near middle of length.

Spines of first legs, $\frac{0, 0, 1, 1, 1}{0, 0, 0, 2, 1}$; of the second and third, $\frac{0, 0, 1, 2, 1}{0, 0, 0, 2, 1}$; of the fourth and fifth, $\frac{0, 0, 1, 2, 1}{0, 0, 0, 2, 1}$; of the sixth, $\frac{0, 0, 2, 2, 2}{0, 0, 0, 2, 1}$; of the seventh and eighth, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 2, 1}$; of the ninth (regenerated), $\frac{0, 0, 2, 0, 0}{0, 0, 1, 2, 1}$; of the tenth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 2, 2}$; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 1, 2, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 1, 2, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$ or $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 1}$ (on one side); of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$. Last two pairs of coxae laterally armed.

Length cir. 5.5. mm.

TYPE.—M. C. Z., No. 271. California: Shasta Springs, August, 1909.

The male of this species is unknown.

NADABIUS COLORADENSIS (Cockerell).

Plate 7, fig. 4.

Lithobius kochii var. *coloradensis* Cockerell, Trans. Amer. ent. soc., 1893, **20**, p. 370.

Lithobius kochii Bollman (non Stuxberg), Proc. U. S. N. M., 1889, **11**, p. 349.

Lithobius dopaintus Chamberlin, Can. ent., 1911, **43**, p. 69.

Lithobius coloradensis Chamberlin, Can. ent., 1911, **43**, p. 70.

DESCRIPTION.—Dorsum testaceous to brown. Head dilute chestnut, commonly darkest caudad of suture. Antennae brown proximally, becoming rufous or yellowish distad. Prosternum brown, the prehensors paler. Venter greyish yellow to dilute brown, the caudal plates somewhat more deeply pigmented as usual. Legs yellowish grey or dilute greyish brown, the posterior pairs more strongly pigmented, often light ferruginous or orange.

Body from 8.5 to 9 times longer than width of tenth plate, commonly toward the latter limit. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 33 : 31 : 33- : 39 : 36.

Head considerably wider than long (10 : 9). Sides convex between eyes and marginal breaks, behind breaks conspicuously converging caudad, weakly excurved.

Antennae short, mostly reaching to the fifth segment, more rarely to the sixth. Composed of nineteen to twenty-three articles, twenty being the usual number. Articles short, cylindric, or each only slightly enlarging distad.

Ocelli ten to fifteen in three or four series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 3, 3; 1 + 4, 4, 3; 1 + 4, 4, 3, 1; 1 + 2, 5, 3, 5; 1 + 3, 5, 3, 3; 1 + 2, 4, 3, 2.

Prosternum in measured specimen 1.64 times wider than long. Distance between chitinous spots 2.4 times the width at level of bottom of sinus; 4 times the dental line. Teeth 2 + 2, rather small, acute; line of apices recurved. Spines much stouter proximally than the bristles, abruptly and characteristically narrowed near middle, the distal portion bristle-like. Median incision widely rounded at bottom, shallow.

First dorsal plate 1.9+ times wider than long; the sides convex, considerably converging caudad; caudal corners strongly rounded. Plates polished but under lens showing a very fine tuberculation or roughening. Angles of none of the dorsal plates at all produced.

Anterior ventral plates nearly smooth, the plates caudad becoming more roughened and showing a more distinct median sulcus, this being deepest on the last two sternites.

Coxal pores of moderate size to small, circular: 3, 4, 4, 4; 3, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 4; 4, 6, 6, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the second to eighth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the ninth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1(0), 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws two; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$, claws two. Last two pairs of coxae laterally armed.

Anal legs short and rather slender. In the male the third, fourth, and fifth articles are dorsally longitudinally furrowed; fifth article at distal end in usual place elevated into a low and rather broad crest similar to that of *iowensis* but lower and less conspicuous.

Gonopods of male very short; bearing one or two bristles, the latter being apparently the normal number.

Claw of female gonopods short and relatively wide; tripartite, the three divisions distinct and subequal or the median usually a little longer than the others. Spines short and stout, the outer somewhat larger than the inner, in ventral view with sides parallel or a little diverging to about distal third or fourth of length, then abruptly narrowing and acuminate; wider surface of inner spine more or less oblique to that of the outer one.

Length 10 to 15 mm. A male 12.5 mm. long has antennae 3.5 mm. long; anal leg 4.25 mm. long; and tenth plate 1.42 mm. wide.

Praematurus.—Color not evident in specimen described.

Antennae very short; articles twenty.

Ocelli 1 + 3, 3; 1 + 4, 2. Caudal ocellus of upper row largest.

Prosternum nearly as in *maturus*, teeth small and acute. 1.6 times wider than long.

Coxal pores very small, circular: 2, 2, 3, 3; 3, 3, 3, 3.

Claw of female gonopods short and wide, three or only two teeth evident. Basal spines 2 + 2, the inner of each pair much shorter and more slender.

Anal legs in male with fourth and fifth articles showing the longitudinal sulcation dorsally but the tibial crest only faintly or not at all indicated.

Ventral spines of first legs 0, 0, 1, 1, 1. Spines of second and third legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the fourth, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the fifth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the sixth and seventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$; of the eighth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$. Coxae of anal legs armed laterally with a small pale spine.

Length (♂) 6.5 mm.; anal leg 2.4 mm. long; antenna 1.6 mm. long.

The *prae-maturus* form described is from West Cliff, Col. It is the specimen referred by Bollman to *L. kochii* Stuxberg, and is thus the type of *coloradensis*, the name having been proposed on the basis of a difference indicated by Bollman between this specimen and typical *kochii*.

TYPE LOCALITY.—Colorado: West Cliff, T. D. A. Cockerell.

Taken also in Colorado at Salina and Tolland (T. D. A. Cockerell), Durango (C. F. Baker), Manitou and Colorado Springs.

NADABIUS MESECHINUS (Chamberlin).

Plate 6, fig. 2.

Lithobius mesechinus Chamberlin, Proc. Acad. nat. sci. Phil., 1903, 55, p. 158.

DESCRIPTION.—Brown. Head the same or but little darker, the anterior portion of frontal region pale. Antennae pale brown or yellowish. Prosternum like head, the prehensors lighter. Venter pale brown, the posterior plates darker. Legs pale brown or testaceous, the caudal pairs darker.

Body robust, in types from slightly less than 6 to 6.4 times longer than width of tenth plate.

Head considerably wider than long (40:37); widest caudally, narrowing slightly to eyes and then very strongly cephalad. Marginal breaks not conspicuous.

Antennae short as usual; composed of nineteen to twenty-one

articles of which the second is considerably longest and those distad of this short and nearly uniform, subcylindric.

Ocelli thirteen to sixteen in three series: *e.g.*, 1 + 5, 4, 3; 1 + 6, 5, 4. Single ocellus much largest. Others decreasing in size cephalad and ventrad; compactly aggregated.

Prosternum 1.7 times wider than long. Distance between chitinous spots 2.2 times width at level of bottom of sinus; 4.6 times length of the short dental line. Teeth 2 + 2; very small, acute; inner larger than the outer. Spine small extending obliquely a little mesad of directly cephalad. Sinus rather large, strictly v-shaped. Sides ectad of spines broadly and widely rounded.

First dorsal plate with sides moderately convex anteriorly and at caudal corners, but only little curved between these parts, a little converging caudad; about two times wider than long. Caudal margin of ninth plate straight or slightly extended at ends. Posterior angles of eleventh and thirteenth dorsal plates weakly produced. More caudal plates very finely roughened.

Coxal pores of medium size or large, circular or a little transversely elongate: 3, 4, 4, 3.

Spines of first legs, $\frac{0, 0, 3, 2, 1}{0, 0, 1, 3, 2}$ or $\frac{0, 0, 3, 2, 1}{0, 0, 1, 3, 1(2)}$; of the second, $\frac{0, 0, 3, 2, 1}{0, 0, 2, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the third to eighth, $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the ninth, $\frac{1, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the tenth, $\frac{1, 0, 3, 2, 2}{0, 0, 3, 3, 2}$; of the twelfth to penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, the penult with two claws; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last two pairs of coxae laterally armed.

Claw of female gonopods short; tripartite; the lobes short, with the median one longest though not much so. Spines unusually short, wide; sides parallel from base to about middle of length at which the acutely acuminate apical division begins; inner spine somewhat smaller than the outer. Inner side of first article somewhat convex.

Length 8–10 mm. A male 10 mm. long has antennae and anal legs 3.5 mm. long and tenth plate 1.57 mm. wide.

TYPE LOCALITY.—Oregon: Meacham, August, 1902.

The male of this species is not known.

NADABIUS IOWENSIS (Meinert).

Plate 7, fig. 6; Plate 8, fig. 1.

Lithobius iowensis Meinert, Proc. Amer. philos. soc., 1886, **23**, p. 177. Bollman, Proc. U. S. N. M., 1888, **11**, p. 409. Chamberlin, Can. ent., 1911, **43**, p. 70, 103. Gunthorpe, Kans. univ. Sci. bull., 1913, **7**, p. 165.

- Lithobius trilobus* Bollman, Proc. U. S. N. M., 1888, **11**, p. 409 ($\sigma^7 \sigma^7$ in part).
Lithobius bilabiatus Bollman (nec Wood), Proc. U. S. N. M., 1887, **10**, p. 256.
Lithobius sexdentatus Kenyon, Can. ent., 1893, **25**, p. 162.
Lithobius bruneri Kenyon, Can. ent., 1893, **25**, p. 162.
Nadabius iowensis Chamberlin, Bull. M. C. Z., 1913, **57**, p. 62. Can. ent., 1914, **46**, p. 302.

DESCRIPTION.—Light yellowish or testaceous brown to dark brown, either uniform excepting the first plate, or with the caudal plates somewhat darker, the first plate in specimens in full color frequently clearly darker than the adjacent plates, approaching the head in color and sometimes fully as dark as the latter. Head from brown through reddish brown to deep brownish black or solid black. Antennae from a lighter brown to very deep brown, tips in the latter case paler. Prosternum and prehensors deep brown. Venter yellowish to brown with the most caudal plates always conspicuously darker brown. Legs yellowish to light brown, the caudal pairs usually more or less darker.

Body varying from only 6.66 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth and twelfth dorsal plates to each other about as 41 : 37 : 40 : 48 : 49 : 46.

Head wider than long usually in ratio 22 : 21. Sides strongly rounded and converging from lateral breaks about corners to straight portion of caudal margin. Smooth and shining, punctae few. Hairs sparse, moderate.

Antennae very short, reaching usually only to end of fifth segment. Articles twenty to twenty-five, twenty-three being not infrequent; subcylindric or a little clavately widening; moderately short, with the second longest and the distal ones becoming very slender.

Ocelli twelve to eighteen in four or five series: *e.g.*, 1 + 4, 4, 4, 3; 1 + 4, 4, 4, 3, 1; 1 + 3, 4, 4, 3, 2; 1 + 3, 4, 4, 3, 1; 1 + 4, 4, 3, 3, 3.

Single ocellus subvertically subelliptic, rather small though clearly larger than any of the seriate ocelli which are comparatively small and closely compacted.

Prosternum between 1.45 and 1.5 times wider than long. Distance between chitinous spots 2.25— times width at level of bottom of sinus; 3.5–3.7 times the dental line. Teeth acute, well chitinized and usually dark, the innermost on each side often considerably smaller than the others; 3 + 3 or 4 + 4, very rarely only 2 + 2, and in one case observed as 6 + 4, the two extra teeth on the one side being separated by an interval from the others. Sinus wide, not acute at bottom. Spine stout at base, distally slender and usually somewhat curved mesad.

First dorsal plate 1.7— times wider than long; posterior corners well rounded, with the sides in front of them nearly straight and a little diverging cephalad to the anterior ends, in some appearing almost parallel. Plates smooth and shining or rarely obscurely somewhat rugose. Hairs becoming more numerous and somewhat longer on the more caudal plates. Posterior corners of ninth, eleventh, and thirteenth plates not at all produced, being commonly obliquely excised, with line of excision making but small angle with the horizontal.

Ventral plate clothed with rather numerous short hairs which become more dense on the caudal plates.

Coxal pores rather small, especially the most proximal ones; circular: 3, 4, 4, 3; 4, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 4.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$, or, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of second to fifth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of seventh and eighth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of ninth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$, being often of one formula on one side and of the other on the opposite; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1(0), 3, 3, 2 \end{smallmatrix}$, the trochanter spine being sometimes missing on one side; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0 \end{smallmatrix}$, claw one.¹ Last three pairs of coxae laterally armed.

Anal legs short. In the female slender. In the male somewhat thicker than in the female; the third, fourth, and fifth joints dorsally longitudinally sulcate as usual, especially so the last two of these, the sulcus on the fifth joint being especially deep distad; fifth joint characterized by the usual low, flattened crest at the distal end; the crest highest distally, pilose with moderately long hairs which are curved at tips (Plate 8, fig. 1).

Gonopods of male small, distally rounded, with sides also somewhat convex and the outer longer and more oblique than the inner; distally each gonopod bearing three or four long bristles.

Claw of female gonopods of moderate size and curvature; usually strictly entire but not infrequently with a dorsal and a ventral denticle weakly indicated, the claw being evidently entire in a secondary way; acutely narrowing distad but apex usually narrowly rounded. Spines 2 + 2, or, occasionally, 3 + 3; of moderate length; when viewed at right angles to broad surface seen gradually to narrow distad with the sides slightly convex and the apex narrowly rounded; inner spine normally somewhat shorter than the outer but the difference appears

¹ A small accessory claw was observed on right leg in a male from Watersmeet, Mich., the claw of the left leg being single as usual.

exaggerated because of the insertion of the inner spine farther proximad. First joint not at all excavated on mesal side proximally.

Length 12–16 mm. A female 12 mm. long has antenna and anal leg, exclusive of coxa, 4 mm. long and tenth plate 1.75– mm. wide. A female of same length may, however, have tenth plate only 1.5 mm. wide. A male 12.5 mm. long has tenth plate 1.75 mm. wide while a second one 13.5 mm. long has this plate of same width as in preceding. (Watersmeet, Mich., chiefly).

Pseudomaturus.— Dorsum prevailingly light brown, with first plate either abruptly darker or not. Head darker brown. Antennae light brown to yellowish. Prosternum and prehensors similar to head or but little paler. Venter paler than dorsum, darker caudally as usual. Legs yellowish to light brown, the posterior pairs distally more pigmented, somewhat light ferruginous or orange.

Antennae as in *maturus*.

Ocelli: *e.g.*, 1 + 3, 3, 3, 2; 1 + 4, 3, 3, 1; 1 + 4, 3, 3, 2; 1 + 4, 4, 3, 2, 1. Thus averaging fewer than in the adult and more commonly in four series.

Prosternum with teeth 3 + 3 or 2 + 2; when 3 + 3 the innermost often much smaller and close to side of sinus.

Coxal pores very small; most frequently: 3, 4, 4, 3; also 3, 3, 3, 3 to 4, 4, 4, 3.

Claw of female gonopods smaller and more acute and paler than in adult. Spines essentially as in *maturus* but distally more acute and the inner one proportionately somewhat smaller. Bristles fewer.

Gonopods of male small and rounded; already bearing the three bristles.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of seventh may be, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$; others as in *maturus*. Last two pairs of coxae laterally armed or last three pairs as in *maturus*.

Anal legs of male modified as in the *maturus* but the crest somewhat smaller and its hairs fewer.

Length 10.5–13 mm. A female 11 mm. long has antenna 3.5 mm. and anal leg near 3 mm. long. (Mongona, Iowa).

Praematurus.— Dorsum yellowish to testaceous and brown. Head brown, always darker than dorsum of body. Antennae light brown proximally, paler distally. Prosternum and prehensors testaceous to brown, usually distinctly darker than the venter which is yellow to dilute brown, tenth caudal plates darker as usual. Legs like venter, but posterior pairs distally light, subferruginous or orange.

Antennae nearly as in older stages.

Ocelli nine to fourteen in three to five series, but mostly in three or four: *e.g.*, 1 + 3, 3, 2; 1 + 3, 3, 3; 1 + 4, 3, 3, 3; 1 + 4, 3, 3, 2, 1. All ocelli deeply pigmented.

Prosternal teeth 2 + 2, equal or very nearly so, rather pale. Sinus wide, subacute at bottom. 1.47 times wider than long. Distance between chitinous spots 2.38 times width at sinus, 3.3 times dental line.

Coxal pores very small: 2, 3, 3, 2; 3, 3, 3, 3; 3, 4, 4, 3.

Claw of female gonopods small, entire, slender and acute, pale. Spines 2 + 2, acutely acuminate, the inner much shorter and more slender than the outer. Distal article mostly with but one bristle; the second with two or three; and the first with three.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$; of the second and third, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$; of the fourth to seventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the eighth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the ninth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$. Only the last pair of coxae laterally armed.

Length 9.5–11 mm. A female 10.5 mm. long has antenna 4 mm. and anal leg 3+ mm. long and tenth plate 1.3 mm. wide. The maximum length overlaps the minimum for the *pseudomaturus*. (Mon-gona, Ia.)

Immaturus.—Dorsum pale brown, most plates showing three paler longitudinal lines, of violaceous tinge throughout. Head and posterior plates darker. Prosternum and prehensors similar to head. Antennae light brown, paler distally. Venter and legs pale, the posterior pairs usually more brightly pigmented.

Antennae in most composed of nineteen articles of which those distad of the third are mostly very short, though varying considerably in length, as usual in yet developing antennae.

Ocelli seven to ten in two or three series: *e.g.*, 1 + 4, 2; 1 + 3, 3; 1 + 3, 3, 2; 1 + 4, 3, 2. First ocellus of top series as large as or larger than the single ocellus.

Prosternal teeth 2 + 2, equal, pale. Sinus somewhat more acute at bottom than in *maturus*.

Coxal pores very small, the most proximal one on each coxa especially minute: 2, 2, 2, 2; 2, 3, 3, 2.

In the smaller specimens short and pale but the three articles already present; of these the distal is short and simply rounded with no indication of a claw and is glabrous; second article with one bristle and first one with one longer bristle in addition to the minute pale chitinous point representing the spine; sternite with two bristles. In larger specimens the claw is present, being small, slender, and acute;

distal article with one bristle, second mostly two and first usually four while sternite may bear as many as ten.

Spines of first legs, $\begin{smallmatrix} 0, 0, 0, 0, 1 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 1(0), 2, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 0, 2, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 0, 2, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the fourth and fifth, $\begin{smallmatrix} 0, 0, 0, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 0, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$; of the sixth, $\begin{smallmatrix} 0, 0, 0, 2, 2 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the seventh to ninth, $\begin{smallmatrix} 0, 0, 0, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 2, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 1, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 0, 3, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 0, 0, 3, 1, 1 \\ 0, 0, 3, 1, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ to $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$. Last pair of coxae alone laterally armed.

Length 5.6–9 mm. In specimen 5.6 mm. long widths of head and of first, third, eighth, tenth and twelfth plates are to each other as 20.5 : 18.5 : 20 : 23 : 24 : 22. (Earliest stage, Watersmeet, Mich.; later, Mongona, Iowa.)

TYPE LOCALITY.—Iowa: McGregor.

Found also in Iowa at McGregor (Davis), Mongona, Tama, Boone, De Witt. Nebraska: Omaha, Fremont. Kansas: Anderson, Bourbon, Coffey, Cowley, Douglas, Franklin, Graham, Jefferson, Labette, Linn, Pottawatomie, Reno, Sumner, and Trego counties (*fide* Gunthorp). Illinois: Rock Island, Franklin Grove, Sterling, Peoria, East Peoria. Indiana: Bloomington (Bollman coll.), La Fayette, Richmond, Greencastle, Salem, New Providence, Wyandotte (*fide* Bollman). Michigan: Watersmeet, Saunders, Menominee, Ludington. Wisconsin: Beloit, Haugen, Marinette. Colorado: Manitou (Hayden Exp. 1873, Camp). Wyoming: Cheyenne.

Variation in this species from place to place is large, the place-modes for size and other characters often differing considerably. In some places the ventral spines of the anal legs would seem to be the more frequently 1, 3, 2, 1 (some places in Illinois and Wisconsin) whereas in others the formula is almost exclusively 1, 3, 3, 1. Segregation of a distinct local variety, however, seems nowhere to have been clearly effected. Specimens cannot be referred to the different stages of postembryonal development on the basis of size because of frequent and wide overlapping. The range in size of the *immaturus*, as limited in the usual way, is very large as it is also, *e.g.*, in the spining of the legs as noted above.

An examination of specimens in several vials from Bloomington, Ind., (Coll. U. S. N. M.) labeled by Bollman as *L. trilobus* shows them for the most part to be referable to the present species, some specimens, however, are *T. pullus*. As these specimens do not very well conform to the original description, it may be supposed either that they were incorrectly referred or that there has been a transfer of

labels or an incorrect reference by number, as many of Mr. Bollman's specimens were indicated only by numbers referring to his personal catalogue.

NADABIUS EIGENMANNI (Bollman).

Plate 7, fig. 5.

Lithobius eigenmanni Bollman, Proc. U. S. N. M., 1888, 10, p. 625.

DESCRIPTION.—Dorsum testaceous to brown. Head in long preserved specimens seems also to be brown with frontal region paler, of orange tinge. Antennae yellowish, darker proximally. Prosteronum like head, or a little paler. Venter pale, yellowish or testaceous, with the caudal plates more deeply pigmented as usual, brown of orange tinge. Most legs pale, the posterior pairs bright yellow or orange.

Body from 7.25 (in type specimen) to 7.75 or 8 times longer than width of tenth plate, being a robust form. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other about as 28 : 26 : 27 : 31 : 32 : 30.5 to considerably wider.

Head from equal in length and breadth; of usual general shape; caudal margin weakly and widely incurved.

Antennae short; articles short and of usual arrangement. Hairs long.

Each eye consisting of from eight to eighteen ocelli arranged in two or three to four and occasionally five series: *e.g.*, 1 + 4, 3; 1 + 4, 4, 3, 1 + 4, 3, 3; 1 + 4, 3, 1; 1 + 4, 3, 2; 1 + 4, 4, 3, 1; 1 + 4, 4, 4, 3; 1 + 3, 4, 5, 4, 1. Single ocellus often small, those of most dorsal row, or at least most caudal one, the largest of all, as well as most caudal of second row, commonly exceeding it in size; or, in largest specimens, the single ocellus is distinctly largest. Ocelli commonly not crowded, deeply pigmented, and rather irregular in form and size.

Prosteronum 1.5 (type) or mostly near 1.6 times wider than long. Distance between chitinous spots 2.4, or a little less, times the width at level of bottom of sinus; 3.5 to 3.8+ times the dental line. Mesal incision of moderate width, its sides recurved. Teeth equal in size or nearly so, rather small, line of apices a little recurved. Spine not very close to tooth; much stouter at base than the bristles, narrowing rapidly distad and above level of apex of tooth slender and bristle-like.

First dorsal plate 1.8 times wider than long; sides strongly diverging cephalad. Dorsal plates rather strongly arched. Smooth. Posterior inner plates with corners obliquely truncate.

Coxal pores circular: 2, 3, 3, 2; 2, 3, 3, 3; 2, 4, 4, 3; 3, 4, 4, 3; 4, 5, 5, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ (*pseudomaturus*) to $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ (*maturus*); of the second, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ (*pseudomaturus*), to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 2, 2 \end{smallmatrix}$; of the third to sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ in fully grown specimens; of the seventh to eleventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$, $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$, the coxa rarely armed; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 0 \end{smallmatrix}$, with the claw single. Last two pairs of coxae laterally armed.

Anal legs in male considerably inflated, the fourth joint most noticeably so. Third, fourth, and fifth joints longitudinally furrowed above, the fourth the most distinctly so. Fourth joint on mesodorsal side toward distal end subdensely clothed with long hairs which at the tips are curved somewhat caudad; joint elsewhere only sparsely clothed with short hairs; fifth joint at distal end above with the usual crest which is low and often inconspicuous excepting in fully grown specimens. Penult legs a little less inflated; similarly sulcate; the fourth joint without the special growth of hair.

Gonopods of male with outer side more oblique than the mesal; distally transversely straight or nearly so; thin, edge-like, distad.

Claw of female gonopods short and proportionately wide; tripartite, with the median lobe little longest and the outer often somewhat smaller than the inner. Basal spines short and very broad, with sides subparallel or somewhat diverging distad to the acuminate apical portion which is rather short and acute with its sides more or less incurved; inner spine considerably and constantly smaller than the outer (Plate 7, fig. 5). Mesal edge of first article straight, as usual in the genus.

Length from 7 to 12.5 mm. A male 9 mm. long has antennae 3.25 mm. and anal leg 3 mm. long with tenth plate 1.17 mm. wide.

TYPE LOCALITY.—British Columbia: Glacier (C. H. Eigenmann).

Taken also in British Columbia at Kaslo. Oregon: Portland, August, 1902.

The description above is based in part upon the types of the species; but these are not fully developed and are in bad condition so that some features could not be made out with certainty. The main part of the account was consequently drawn from specimens collected at Portland, Oregon, and Kaslo, B. C.

The species in the region about Kaslo varies much, but intergrades seem too frequent for the separation of a distinct variety.

NADABIUS HOLZINGERI (Bollman).

Lithobius holzingeri Bollman, Entomol. Amer., 1887, **3**, p. 83. Chamberlin, Can. ent., 1911, **43**, p. 104.

DESCRIPTION.—Brown to chestnut, the head darker. Prosternum nearly like head, the prehensors somewhat paler. Venter paler brown, the caudal plates darker, somewhat chestnut. Legs yellowish brown or brown, the caudal pairs, as usual, clearly darker.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 44 : 44 : 45 : 52 : 54 : 52.

Head wider than long in ratio 22 : 19. Widest at marginal breaks, which are pronounced. Caudal margin straight. A transverse impression a little in front of caudal marginal thickening, the impression deepest at middle.

Antennae short. Articles twenty to twenty-three (twenty-eight *seq.* Bollman); short.

Ocelli, in types examined, sixteen or seventeen in four or five series: *e. g.*, 1 + 4, 4, 4, 3; 1 + 3, 4, 4, 4; 1 + 3, 4, 3, 3, 3. Single ocellus elliptic or oval, large.

Prosternum 1.5 or 1.6 times wider than long. Distance between chitinous spots 2.25–2.5 times the width at level of bottom of sinus; 3.4–3.5 times length of dental line.

First dorsal plate with sides rounded and diverging cephalad; 1.76 times wider than long. Posterior angles of eleventh and thirteenth dorsal plates with a slight tendency toward production as usual.

Coxal pores circular, moderately small: 3, 4, 4, 4; 4, 5, 5, 4; 5, 6, 6, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the second to fourth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the fifth to tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh and twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; claws three, the two accessory claws being large and distinct; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claw one, long. Last pair of coxae laterally armed.

Anal legs of male short and moderately thickened; fourth and fifth articles dorsally rather strongly longitudinally sulcate and the fifth joint having at its distal end a low, thin crest in usual position, with its dorsal line convex and highest distad. Penult legs similarly somewhat thickened and dorsally furrowed, but with no crest.

Gonopod of male subcuneate, distally subtruncate; bearing three bristles.

Claw of female gonopods short, wide, tripartite. Spines short and stout, subequal.

Length 10 to 14 mm. A male 14 mm. long has antenna 5.5 and anal leg near 4.5 mm. long.

TYPE LOCALITY.—Minnesota: Winona. (J. M. Holzinger).

The description above is drawn from three of the original types (♂♂), the statement as to the female gonopods, however, being taken from the original description. Bollman gives length of males as from 16 to 21 mm., but this is much too large as is frequent with Bollman's measurements,—possibly the anal legs are included in them.

POKABIUS Chamberlin.

Poabius Chamberlin (nec Koch), Ann. Ent. soc. Amer., 1912, 5, p. 153.

Pokabius Chamberlin, Can. ent., 1912, 44, p. 316.

Head with lateral marginal interruptions distinct (*Pokabius sens. str.*; *Anobius*) or sometimes scarcely evident (*Lophobius*).

Antennae short or very short; articles normally twenty, occasionally varying a little from this in individual cases.

Eye composed of seriate ocelli which are from six to twenty-five in number and are arranged in from two to six series. Single ocellus enlarged.

Prosternal teeth 2 + 2; line of apices more or less recurved. Spines slender, distally bristle-like.

Posterior angles of none of the dorsal plates or those of the ninth, eleventh, and thirteenth produced.

Coxal pores uniseriate, circular.

Gonopods of the male uniarticulate.

Claw of female gonopods normally tripartite, occasionally only bipartite, the median lobe commonly not much longest. Basal spines 2 + 2, usually intermediate in length and stoutness, but varying in both directions. First article of gonopods not excavated proximally.

Tarsi of all legs divided.

Anal legs of the male with fourth joint characterized by a dorsal longitudinal ridge more or less conspicuously elevated into a lobe at or near the proximal end, and the third joint with a dorsal ridge usually elevated at the distal end (*Pokabius sens. str.*; *Anobius*, Plate 8, fig. 4; Plate 9, fig. 1, 3, 4; Plate 10, fig. 1, 3; and Plate 11, fig. 1, 2); or in some species the ridge of fourth joint less developed and more or less elevated at distal end or in some cases practically absent (*Lophobius*). Penult legs never with any special lobes (excepting in *P. (Anobius) centurio*).



FIG. 8.— Distribution of Pokabius.

From one to three last pairs, or rarely none, of coxae laterally armed. Fifth joint of all legs between first and twelfth with two dorsal spines. Dorsal spines of anal legs in female varying from 1, 0, 2, 1, 0 and 1, 0, 3, 1, 0, the most common formula, to 1, 0, 4, 1, 0, and in the male from 1, 0, 2, 1, 0 to 1, 0, 6, 1, 0; ventral 0, 1, 3, 2, 0 or 0, 1, 3, 2, 1; claw one (or in *socius* only). Dorsal spines of penult legs 1, 0, 3, 1, 1 or rarely 1, 0, 2, 1, 1; ventral, 0, 0, 2, 3, 2 to 0, 1, 3, 3, 1 and 0, 1, 3, 3, 2; claws two or three. Dorsal spines of thirteenth legs 1, 0, 3, 1, 1 or rarely (*utahensis*) 1, 0, 2, 1, 1; ventral, 0, 1, 3, 3, 2 or 0, 0, 3, 3, 2, rarely only 0, 0, 2, 3, 1 (*utahensis*). Dorsal spines of twelfth legs 1, 0, 3, 1, 1 or rarely 1, 0, 2, 1, 1 to 1, 0, 3, 1, 2; ventral 0, 0, 2, 3, 2 or 0, 0, 3, 3, 2. Dorsal spines of first legs, 0, 0, 2, 2, 1 to 0, 0, 3, 2, 2; ventral 0, 0, 1, 2, 1 to 0, 0, 2, 3, 2.

Length 6.5 to 17.5 mm. but mostly from 9 to 15 mm.

TYPE.—*P. verdescens* Chamberlin.

Variation among the species embraced in the genus as here defined is in many features large; but there seems no reason to doubt its entire naturalness excepting only the portion designated as the subgenus *Lophobius*. The latter may have to be withdrawn and possibly subdivided when the region over which it ranges is more thoroughly explored and the species now recognized and others yet to be found are better known in both sexes.

Pokabius is a comparatively large genus having its center in the southwest, ranging up the west coast to Washington and British Columbia and up the Mississippi valley to southern Minnesota and Wisconsin (Figure 8). In the upper Mississippi valley it is represented chiefly by *P. bilabiatulus* a very abundant species. The distribution of the subgenus *Lophobius* is separately shown (Figure 9). The species of *Lophobius* are found under stones over foothills and in similar open, dryer and less wooded areas in largely semi-desert regions.

The key does not include *P. carinipes* (Daday), which is insufficiently known. (Cf. p. 367).

Key to Subgenera and Species of Pokabius.

- a. Posterior angles of ninth, eleventh, and thirteenth dorsal plates produced. *Anobius*, subgen. nov.¹
- b. Dorsal spines of twelfth legs 1(0), 0, 3, 1, 2; head wider than long; penult leg of ♂ with a lobe on the fourth joint; length 10 mm. or less. *P. centurio* (Chamberlin).

¹ *P. (Anobius) centurio* (Chamberlin). TYPE.

- bb.* Dorsal spines of twelfth legs 1, 0, 3, 1, 1; head as long as wide; penult leg in ♂ with no such lobe; length 13–16 mm.
P. gilac, sp. nov.
- aa.* Posterior angles of none of the dorsal plates produced.
- b.* Anal leg of ♂ with a dorsal ridge on fourth joint elevated into a conspicuous lobe at or near the proximal end; marginal interruptions of head conspicuous. *Pokabius sens. str.*
- c.* Dorsal spines of anal legs of ♂ 1, 0, 4, 1, 0 to 1, 0, 6, 1, 0; of ♀. 1, 0, 4, 1, 0.
- d.* Body 8.75–9.5 times longer than width of tenth plate; ventral spines of thirteenth legs usually 0, 1, 3, 3, 2.
*P. bilabiatu*s (Wood).
- dd.* Body only 6.7–8 times longer than width of tenth plate; ventral spines of thirteenth legs usually 0, 0, 3, 3, 2.
*P. bilabiatu*s *verdescens* Chamberlin.
- cc.* Dorsal spines of anal legs 1, 0, 3, 1, 0 or 1, 0, 2, 1, 0 in both ♂ and ♀.
- d.* None of the coxae laterally armed. Ventral spines of penult legs 0, 1, 3, 3, 1. *P. disantus*, sp. nov.
- dd.* One or more pairs of posterior coxae laterally armed; ventral spines of penult legs 0, 1, 3, 3, 2.
- e.* Only the last pair of coxae laterally armed.
- f.* Distance between chitinous spots 3.5 times the dental line and near 2.33 times width at sinus; anal leg of ♂ (Plate 10, fig. 3). . . . *P. utahensis* (Chamberlin).
- ff.* Distance between chitinous spots near 4.4 times dental line and 2.9 times width at sinus; anal leg of ♂ (Plate 11, fig. 2). *P. sokorus* (Chamberlin).
- ee.* Last 2 or 3 pairs of coxae laterally armed.
- f.* Anal legs of ♂ with dorsal spines normally 1, 0, 2, 1, 0 and lobe of fourth joint at extreme proximal end (Plate 9, fig. 1). *P. clarigerens* (Chamberlin).
- ff.* Anal leg of both ♂ and ♀ with dorsal spines 1, 0, 3, 1, 0 and lobe of fourth joint cephalad of extreme proximal end.
- g.* Dorsal spines of first legs normally 0, 0, 3, 2, 2; claw of ♀ gonopods subtruncate with lobes but weakly indicated; anal leg of ♂ (Plate 9, fig. 4).
P. pitophilus (Chamberlin).
- gg.* Dorsal spines of first legs normally 0, 0, 2, 2, 2; claw of ♀ gonopods distally acute with 3 lobes

- distinct and the median much longest; anal leg of ♂ (Plate 8, fig. 4). .*P. iginus* (Chamberlin).
- bb. Anal leg of ♂ with dorsal ridge elevated, if at all, at distal end, never with lobe at proximal end, sometimes not evident; marginal interruptions of head usually weak or scarcely manifest.*Lophobius*, subgen. nov.
- c. All of anterior legs, or all but first 1 or 2 pairs, with third joint bearing 2 ventral spines.
- b. Ventral spines of penult legs 0, 1, 3, 3, 2.
- c. Anal leg with 2 claws.*P. socius* (Chamberlin).
- cc. Anal leg with the claw single.
- d. Dorsal spines of twelfth legs 1, 0, 3, 1, 1.
- e. Ventral spines of anal legs 0, 1, 3, 2, 0; of the twelfth and thirteenth 0, 0, 3, 3, 2.
-*P. collium* (Chamberlin).
- cc. Ventral spines of anal legs 0, 1, 3, 2, 1; of twelfth and thirteenth, 0, 0, 2, 3, 2. .*P. pungonius* (Chamberlin).
- dd. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 1, 0, 3, 1, 2.
- e. Ventral spines of anal legs 0, 1, 3, 2, 1; head a little longer than wide.*P. arizonae*, sp. nov.
- cc. Ventral spines of anal legs normally 0, 1, 3, 2, 0; head wider than long.*P. helenae*, sp. nov.
- bb. Ventral spines of penult legs 0, 1, 3, 3, 1 (lobe at distal end of fourth joint of anal leg in ♂ strongly developed).
-*P. castellopes* (Chamberlin).
- aa. First 7 pairs of legs with the third joint bearing but a single ventral spine.*P. eremus*, sp. nov.

ANOBIUS, subgen. nov.

POKABIUS CENTURIO (Chamberlin).

Plate 10, fig. 1, 2.

Lithobius centurio Chamberlin, Proc. Acad. nat. sci. Phil., 1905, 56, p. 651.

Poabius nankus Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 153, pl. 12, fig. 4.

DESCRIPTION.—From light orange-brown to dark brown in specimens in full color; with typically a darker median longitudinal band more or less evident, and with some of the major plates in some degree darkened along caudal border. Head nearly same as dorsum or a little lighter, paler in front of suture and darkened over middle of

caudal portion. Antennae light brown. Venter a lighter brown than dorsum, the posterior sternites darkest, all excepting the latter with a paler central circular area. Anterior legs yellowish, the posterior pairs becoming brown, uniform.

Body very robust, being typically only about 5.5 times longer than width of tenth plate. Twelfth plate as wide as, or wider than, the tenth, and the tenth wider than the eighth. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 49 : 46 : 51 : 61 : 68 : 70.

Head considerably wider than long (about 10 : 9). Caudal margin widely and moderately incurved. Width not much varying in region between eyes and a level a little caudad of marginal breaks, which are weak and very oblique, the sides caudad of this region strongly converging to caudal corners. A deep and conspicuous but rather short transverse sulcus parallel with and a little in front of median portion of frontal suture. A shallow curving longitudinal furrow each side of middle in front of caudal border. Finely punctate and but slightly weakly roughened.

Antennae short; articles normally twenty but varying from nineteen to twenty-two, moderate, decreasing distad.

Ocelli fifteen to twenty-two in usually four series: *e. g.*, 1 + 5, 4, 4, 1; 1 + 5, 4, 4, 2; 1 + 5, 5, 4, 3; 1 + 6, 6, 5, 4. Ocelli closely curved and in consequence commonly hexagonal. Single ocellus large, elliptic, lying obliquely beneath and contiguous with caudal ends of series.

Prosternum about 1.6 times as wide as long. Width between chitinous spots 2.75, or somewhat more, times as great as width at level of bottom of sinus; 5.2 times as great as dental line. Teeth 2 + 2; small, acute, with apical portion sometimes extended into a bristle-like tip which is easily broken off. Spine as usual, distally bristle-like, borne on a small tubercle ectad of outer tooth, about three somewhat similar bristles ectad of the spine.

All dorsal plates finely roughened but the caudal ones more distinctly so. Most plates with a median furrow, sometimes replaced by two, and on each side one or two approximate ones diverging from it caudad. Ninth, eleventh, and thirteenth dorsal plates with the caudal angles strongly produced, but apices of processes a little rounded rather than acute. Posterior angles of seventh plate very slightly extended caudad, the mesal side of extended portion long and making but slight angle with median portion of the margin. Caudal corners of sixth plate a little obliquely excised. Lateral and caudal margins of

plates bearing numerous very short, acutely tipped, hairs upon minute serratures.

Ventral plates with two main wide transverse furrows between which there may be finer impressed lines. The last plate with two sharply impressed longitudinal sulci converging from the anterior margin and ending abruptly at about middle of the plate, where their ends are united by a less strongly impressed transverse sulcus; the preceding plate similarly but rather less conspicuously marked. Last ventral plate with adjacent coxae and succeeding segment subdensely pilose, the anterior plates being only very sparsely clothed.

Coxal pores small and circular, with those of each coxa widely separated: 2, 3, 3, 2; 3, 3, 3, 3.

Spines of the first legs, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the second to tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\frac{1(0), 0, 3, 1, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult same as of thirteenth, claws three; of the anal, $\begin{smallmatrix} 1, 0, 2, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ (σ) or $\begin{smallmatrix} 1, 0, 2, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ (φ , also σ), claw one. Last pair of coxae laterally armed.

Anal legs of male short and rather slender; the third joint abruptly produced at extreme distal end subdorsally into a high lobe, the caudal face of which is vertical or at right angles to axis of joint and the anterior face but little slanting, the lobe bearing two (or one) of the dorsal spines; fourth joint produced into a larger conspicuous lobe at proximal end and contiguous with the lobe of the preceding joint, the lobe somewhat plate-like, continuing caudad as a lower ridge along mesal side of dorsal surface (Plate 10, fig. 1). In the penult legs of male the prefemur is elevated into a low, inconspicuous lobe at distal end, while the femur or fourth joint bears at its distal end a conspicuous lobe which is rather narrow from side to side; this lobe projects conspicuously dorsocaudad over plane of the articulation with tibia, both its distal and its proximal surfaces slanting in this direction but the proximal surface at an angle with the distal so that the lobe decreases distad in thickness as well as in width.

Gonopods of male small, low conical, distally rounded, pale, extended caudoectad.

Claw of female gonopods tripartite; median lobe largest though blunt and comparatively short. Spines moderate in length and stoutness, narrowing a little from base to short apical portion, with sides a little incurved; inner spine shorter and a little more slender than the outer (Plate 10, fig. 2).

Length 13–15 mm. A male 14.25 mm. long has anal leg 5 mm. long and tenth plate 2.6 mm. wide.

TYPE LOCALITY.—New Mexico: Las Vegas.

Found also in New Mexico at Las Valles (T. D. A. Cockerell), Santa Fe (H. S. Barber).

This is the only member of the genus thus far noted to have the penult, as well as the anal legs of the male pronouncedly modified.

POKABIUS GILAE, sp. nov.

Plate 11, fig. 1.

DESCRIPTION.—Dorsum light brown or testaceous, with anterior plates of more greyish cast; posterior borders of major plates in middle and anterior region with a blackish caudal border. Head somewhat ferruginous, darker caudad of suture and especially in a median blackish spot contiguous with it. Antennae brown proximally, yellow at tips. Prosternum and prehensors light testaceous. Venter dilute greyish brown. Legs dilute brown, the caudal pairs darker brown, the tarsi and mesal surface of anal pair lighter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 60 : 51 : 58 : 70 : 76 : 75.5.

Head subcordate, but with caudal margin nearly straight. Equal in length and width. Marginal breaks weak.

Antennae as usual.

Ocelli fourteen to sixteen in four series in type: 1 + 2, 5, 4, 2; 1 + 5, 5, 3, 2.

Prosternal teeth small. Median sinus small, shallow, widely v-shaped. Spine slender, straight and long. Prosternum 1.45 times wider than long. Distance between chitinous spots 2.8+ times the width at level of sinus; 4.6 times the dental line.

First dorsal plate very moderately narrowed caudad; 1.64 times wider than long. Posterior angles of eleventh and thirteenth, and of ninth on one side rather weakly produced (probably both normally produced in ninth).

Coxal pores small: 2, 2, 2, 2; 2, 3, 3, 2.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the third and fourth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the fifth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 2, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$ claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ claw one. Last three pairs of coxae laterally armed.

Penult legs of male without special lobes or other modifications. Anal legs of male with the third and fourth joints dorsally ridged and

produced into lobes at their contiguous ends in the general way usual in the genus, the third bearing a longitudinal dorsal ridge elevated distally into a lobe which at base is contiguous with a lobe at proximal end of a longitudinal ridge on fourth joint (Plate 11, fig. 1).

Length between 9 and 10 mm. in type.

TYPE.—M. C. Z., No. 184. Arizona: Thatcher.

Known only from the male. Collected under willow leaves at edge of Gila River, April, 1913.

POKABIUS BILABIATUS (Wood).

Plate 8, fig. 2.

Lithobius bilabiatus Wood, Proc. Acad. nat. sci. Phil., 1867, p. 130. Stuxberg, Ofvers. Vet.-akad. Förhandl., 1875, **32**, no. 3, p. 18, 31, 32. Chamberlin, Can. ent., 1911, **43**, p. 103.

Archilithobius bilabiatus Stuxberg, Proc. Cal. acad. sci., 1876, **7**, p. 138, 139.

Lithobius tuber Bollman, Proc. U. S. N. M., 1887, **10**, p. 256.

Lithobius malterris Kenyon, Can. ent., 1893, **25**, p. 161.

Poabius bilabiatus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153. Kan. univ. Sci. bull., 1913, **7**, p. 167.

DESCRIPTION.—Dorsum from light brown or testaceous to dark brown in specimens in full color, with the posterior plates usually somewhat darker than the others, while the plates generally may be paler along caudal border and in a median longitudinal line; first dorsal plate either the same as adjacent ones or it may be, in fully colored specimens, decidedly darker and not much paler than the head. Head from brown of a dilute chestnut tinge to deep brownish black. Antennae like the head or nearly so, tip rufous. Prosternum in paler specimens nearly like the head, in darker ones paler than head, dark brown but not blackish; prehensors may be a little paler than prosternum. Venter testaceous to brown of lighter shade than dorsum, caudal plates darker as usual. Legs testaceous to clear brown when in full color; posterior pairs much darker, usually much like head in color, their tarsi rufous.

Body typically long and slender being from 8.75 to 9.5 times longer than width of tenth plate from which it is only moderately narrowed cephalad. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 47 : 44 : 46 : 52 : 53 : 51.

Head considerably wider than long (*e.g.*, 47 : 43). Caudal margin widely but only weakly incurved, laterally widely curving to and

about the corners. Sides between posterior corners and marginal breaks usually substraight. On caudal portion of head a transverse semicircular impression is usually conspicuous, a distinctly impressed transverse suleus on each side being also evident in front of caudal border. Finely and rather densely punctate.

Antennae very short, reaching only to fourth and fifth body-segments. Moderately attenuated but not very slender distally. Composed of the usual twenty, or occasionally of twenty-one or twenty-three articles, which are short but vary considerably in different specimens.

Ocelli thirteen to seventeen in four, or less commonly in three, series: *e.g.*, 1 + 5, 4, 3; 1 + 4, 5, 3, 1, a frequent arrangement; 1 + 3, 4, 3, 1; 1 + 3, 4, 4, 1; 1 + 3, 4, 3, 2; 1 + 4, 4, 3, 1; 1 + 4, 4, 3, 2; 1 + 4, 5, 4, 2; 1 + 5, 4, 3, 2; 1 + 5, 4, 4, 3. Single ocellus moderate in size. Series usually distinct and regular. Ocelli of top row not much larger, the decrease ventrad being gradual and moderate.

Prosternum between 1.57 and 1.7, times wider than long. Distance between chitinous spots in an average specimen measured 2.4 times the width at level of bottom of median sinus and 4 times the dental line. Teeth 2 + 2; line of bases forming a weakly reentrant angle and line of apices straight or nearly so, the inner tooth being usually larger; teeth acute. Spine stout proximally, slender distally and usually somewhat curved; attached a little caudad of margin.

First dorsal plate about 1.7 times wider than long; surface finely punctate and roughened. Major plates mostly showing the short transverse sulcus toward each lateral margin near caudal third and usually one or two dot-like impressions on each side farther cephalad. Under lens showing a fine roughening which is somewhat more pronounced on caudal ones. Posterior corners of all plates distinctly and more or less uniformly simply rounded.

Ventral plates with three longitudinal sulci deeply and distinctly impressed, a submedian transverse suleus also evident on most plates. The median longitudinal sulcus less distinct on the anterior plates. On last two plates a v-shaped impression with apex caudad, this most distinct on the ultimate one, the two lateral longitudinal sulci being evident in addition, at least on the penult plate.

Coxal pores moderate, the most proximal one on each coxa often very small, all circular or subcircular: 3, 5, 4, 3; 3, 5, 5, 3; 3, 5, 5, 4; 3, 6, 4, 4; 4, 4, 5, 4; 4, 5, 5, 3; 4, 5, 5, 4; 4, 5, 6, 5; 4, 6, 6, 4; 4, 6, 6, 5; 5, 5, 5, 3; 5, 5, 5, 4; 5, 6, 6, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the third and fourth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of fifth to tenth,

0, 0, 3, 2, 2; of the eleventh, $\frac{0, 0, 3, 2, 2}{0, 0, 3, 3, 2}$ or $\frac{0, 0, 3, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$; of the thirteenth and penult, $\frac{1, 0, 3, 1, 1}{0, 1, 3, 3, 2}$, those of penult less often $\frac{1, 0, 3, 1, 1}{0, 0, 3, 3, 2}$, claws three; of the anal, in the male, $\frac{1, 0, 6, 1, 0}{0, 1, 3, 2, 0}$ $\frac{1, 0, 5, 1, 0}{0, 1, 3, 2, 0}$ or rarely only $\frac{1, 0, 4, 1, 0}{0, 1, 3, 2, 0}$ but in the female nearly always, $\frac{1, 0, 4, 1, 0}{0, 1, 3, 2, 0}$, rarely $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last three or two pairs of coxae laterally armed.

In female the posterior legs are short and slender, wholly without special lobes or furrows. In the male the third article of anal legs is produced at distal end mesad or dorsomesad into a large lobe the caudomesal side of which is convexly rounded and bears above five or six, or rarely in small specimens (*pseudomaturus*) but four, stout spines of which the most mesal is largest, and immediately ectad of these spines a subconic or rounded process which projects dorsad or dorsocaudad and bears distally a number of very short acute bristles; ectad of hinge on dorsal side a single spine in usual position. Fourth joint at a little distance caudad of its anterior end produced mesodorsad into a very large and conspicuous flattened lobe which has its anterior side nearly straight and transverse to axis of joint; caudad the lobe lowers obliquely to a low ridge which at distal end of joint is extended into a small, conical, distally strongly rounded, process bearing several aculeate hairs, this process being larger than the similar one on third joint; lobe densely clothed at its rounded apex with short aculeate bristles (cf. var. *verdescens* Plate 8, fig. 3). Penult legs without lobes but the third, fourth, and fifth articles, the fourth most distinctly, dorsally longitudinally sulcate.

Gonopods of male small and wart-like; commonly distally subtruncate; bearing usually a robust bristle inserted in a distinct indentation and two smaller bristles.

Claw of female gonopods short and relatively wide; but little curved; tripartite, with the median lobe largest, acute; lateral divisions small, or very small, and tooth-like, occasionally the inner one absent and rarely the claw appearing subentire while in other cases it may show two short, blunt and nearly equal divisions. Basal spines of moderate size, with the outer considerably larger than the inner; narrowed uniformly from base distad to beginning of about distal fifth of length, where it is very obliquely truncate on exterior side, apex acute (Plate 8, fig. 2).

Length 11 to 17.5 mm. A male 17 mm. long has anal leg 4.7 mm. long; antenna 5 mm. long; and tenth plate 1.93 mm. wide. A female 15 mm. long has tenth plate 1.57 mm. wide.

Pseudomaturus.—Coloration as in *maturus* or somewhat paler in average specimens.

Antennae as in *maturus*.

Ocelli somewhat fewer and frequently in but three series: *e. g.*, 1 + 4, 4, 3.

Claw of female gonopods smaller and often with only one, the ventral, of the lateral teeth distinct. Bristles of joints somewhat fewer. Spines as in *maturus*, or the inner relatively a little smaller.

Spining of legs as in adult, but dorsal spines of anal legs in male more often only 1, 0, 4, 1, 0.

Relatively somewhat wider in proportion to length than fully matured specimens.

Length 9.5–12 mm.

Praematurus (late).—Dorsum light brown or testaceous, the posterior plates darker and sometimes verging toward chestnut. Head chestnut. Antennae at base brown or light chestnut but paler over most of length with tip lightest. Venter dilute brown, with the anterior plates somewhat darkened and the posterior ones more strongly so. Legs pale yellowish to pale greyish brown, the posterior pairs in some degree darker but pale distally. Prosternum similar to head but more dilute, the prehensors somewhat lighter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 29 : 25 : 27 : 31 : 32 : 30. Proportionately broader than in adult, sometimes being only eight times longer than width of this plate.

Antennae essentially as in adult.

Ocelli small, well separated; in number and arrangement: *e. g.*, 1 + 3, 3, 3; 1 + 5, 4, 2.

Prosternum nearly as in adult, but in the one case measured only 1.5 times wider than long with distance between chitinous spots 2.73 times width at sinus and 4.1 times dental line.

Coxal pores small: 3, 3, 3, 3; 3, 4, 4, 3; 3, 3, 4, 3.

Claw of female gonopods small, thin, and pale, acute, the exterior or ventral tooth small and the inner or dorsal one not at all or but weakly indicated. Basal spines 2 + 2, the same form as in adult or nearly so, but the inner relatively much shorter and more slender, acute.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1, \\ 0, 0, 1, 3, 1, \end{smallmatrix}$ of the second to sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2, \\ 0, 0, 2, 3, 2, \end{smallmatrix}$ of the seventh to eleventh, $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 0, 3, 2, 2, \end{smallmatrix}$ of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 0, 2, 3, 2, \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 0, 3, 3, 2, \end{smallmatrix}$ of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 1, 3, 3, 2, \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 0, 3, 3, 2, \end{smallmatrix}$ to $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 1, 2, 3, 2, \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 0, 2, 3, 2, \end{smallmatrix}$ of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1, \\ 0, 1, 3, 3, 2, \end{smallmatrix}$ of the anal (♀), $\begin{smallmatrix} 1, 0, 4, 1, 0, \\ 0, 1, 3, 2, 0, \end{smallmatrix}$. Last two pairs of coxae laterally armed. (De Witt, Ia.).

Immaturus.—Dorsum pale brown, with caudal plates darker. Head brown or dilute ferruginous brown, paler in front of the suture.

Antennae pale greyish brown or yellowish, brighter distad. Prosternum yellowish brown, prehensors lighter. Venter pale, caudal plates more densely pigmented, yellowish to orange. Legs pale, brighter at tips, the posterior pairs more pigmented, brightest at tips like the others.

Body only 7.5 times longer than width of tenth plate thus still wider proportionately than in *praematurus*. Widths of head and usual series of plates to each other as 22 : 18 : 19 : 22.5 : 23 : 22.

Head relatively longer than in adult in specimens examined ($\sigma^7\sigma^7$) being but little wider than long.

Antennae very short with 20 articles already present, these short and very short; antennae submoniliform.

Ocelli mostly small and well separated; single ocellus relatively large; ocelli of top row largest of seriate ocelli. Ocelli in three series: *e. g.*, 1 + 4, 2, 2; 1 + 3, 4, 2.

Prosternum 1.54 times wider than long. Distance between chitinous spots 2.85 times width at sinus; 4.44 times dental line. Teeth 2 + 2, rather small, line of apices a little recurved. Spine and sinus as in *praematurus*.

Coxal pores: 2, 2, 3, 2; 2, 3, 3, 2; 2, 3, 4, 3.

Spines of first legs, $\begin{smallmatrix} 0, 0, 0, 0, 1 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 0, 1, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 0, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$ and $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the third and fourth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$; of the fifth to seventh, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eighth and ninth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the anal ($\sigma^7\sigma^7$), $\begin{smallmatrix} 1, 0, 4, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ (observed on one side). Last pair of coxae laterally armed.

Anal legs of male with third joint but little produced mesad at distal end. Fourth joint already showing in a distinctly developed form the flattened mesodorsal process toward its proximal end, but this process relatively much shorter than in the *maturus* and the angle formed by anterior and posterior edges much more obtuse, the anterior side oblique, not nearly at right angles as in adult, and the lobe not showing the acuteate hairs; the smaller subconical processes at distal ends of third and fourth joints of adults not yet at all indicated.

Length 6.5–7.5 mm. A male 7.5 mm. long has antennae 3 mm. and anal leg 2.6 mm. long with width of tenth plate 1 mm. (DeWitt and Tama, Iowa).

Pullus IV (Larva IV).—Dorsum pale yellowish white with the head more pigmented, yellowish. Antennae and legs whitish. Prosternum and prehensors like head. Venter nearly same as dorsum of body.

Body more strongly narrowed caudad of tenth plate than in adult. Ratio of widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 32 : 26.5 : 28 : 30 : 28 : 23.

Head equal in length and breadth. Caudal margin straight or a little excurved.

Antennae composed of seventeen articles which, excepting the first three and the ultimate one, are very short; submoniliform; subsparingly hirsute.

Ocelli 1 + 2, 1. The first, or caudal, ocellus of upper series relatively very large, as large as or larger than, the single one and much larger than others of series.

Prosternum 1.54 times wider than long. Distance between chitinous spots 2.55 times width at sinus and 3.53 times dental line. Teeth 2 + 2, small, subequal with line of apices straight or slightly recurved. Spine and sinus as in older stages, or former, proportionately to teeth, somewhat stouter.

A single coxal pore present on each twelfth coxa.

Spines of first legs, $\begin{smallmatrix} 0, 0, 0, 0, 1 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$; of the second to eighth, $\begin{smallmatrix} 0, 0, 0, 0, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$; of the ninth, $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 0, 1, 1, 1 \end{smallmatrix}$; of the tenth to twelfth, $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 0, 1, 1, 1 \end{smallmatrix}$. (De Witt, Ia.).

Last three pairs of legs showing only as short pale buds in which the joints, excepting the coxa, are not as yet distinctly indicated.

TYPE LOCALITY.—Illinois: Rock Island.

Found also in Illinois at Franklin Grove, Peoria, Sterling. Iowa: De Witt, Tama. Nebraska: Grand Island. Kansas: Cowley, Douglas, Graham, Sumner, and Trego counties (*vide* Gunthorp). Indiana: Bloomington (Bollman). Minnesota: Winona (Holzinger coll., seq. Bollman). Wisconsin: Devil's Lake. Mississippi: Byram.

This is apparently a very common species in the states of the northern Mississippi valley, ranging also southward toward the Gulf as indicated by its occurrence in Mississippi. It varies much in many of its features and, from material available for study, seems to have a considerable tendency toward the formation of minor forms or varieties; but intergradation is frequent and, in spite of differences in local modes, it seems inadvisable to attempt their separation as varieties, except in the case of *verdescens*, until the species is more thoroughly known and the significance of the differences indicated more clearly understood. The species offers excellent material for a careful study in variation.

POKABIUS BILABIATUS VERDESCENS Chamberlin.

Plate 8, fig. 3.

Poobius verdescens Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 154, pl. 13, fig. 1.

DESCRIPTION.—Dorsum sometimes from clear brown to light chestnut with first plate and caudal borders of others dark but more often brown of a pronounced olivaceous cast. Head either like dorsum but usually ferruginous brown or chestnut, dusky caudad of the suture. Prosternum olivaceous to dark brown. Venter typically light to dark olivaceous though sometimes clear brown. Legs pale olivaceous to brown with posterior pairs darker as usual.

Body more robust than in *bilabiatu*s proper, varying from only 6.7 to 8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth and twelfth plates (in ♂) to each other as 64 : 63 : 63+ : 71 : 71 : 64.

Antennae typically somewhat longer than in *bilabiatu*s, reaching seventh segment.

Ocelli as in the species.

Prosternum typically relatively narrower than in the species, being from 1.5 to 1.57 times wider than long. Distance between chitinous spots 2.5 to 2.8 times width at sinus and 4 to 4.5 times dental line. Line of apices of teeth straight or very nearly so.

Spining of legs very nearly as in *bilabiatu*s, excepting that the ventral spines of the thirteenth legs, in all specimens studied, is 0, 0, 3, 3, 2, a formula sometimes present but not usual in the species.

Anal legs of male as described for *bilabiatu*s proper.

Female gonopods essentially as in the species.

Length 11–18 mm.

TYPE LOCALITY.—Illinois: Peoria!

Taken also in Iowa: Tama! Mongona! Boone! Mississippi: Canton!

This varietal form occurs in the same general region as the species proper. Judging from limited number of specimens of the immature stages examined, the ratio of length to width of tenth plate *increases* with development in *bilabiatu*s, the slenderness becoming more and more pronounced; whereas, on the other hand, in *verdescens* it *decreases*. Study of more extensive collections may break down the seeming differences between the two forms; but if so the range of variation in the species will be found to be unusually great.

POKABIUS DISANTUS, sp. nov.

Plate 9, fig. 3.

Lithobius clavigerens Chamberlin, Pomona coll. journ. ent., 1910, 2, p. 373.

DESCRIPTION.—Dorsum testaceous. Head dusky behind suture and abruptly lighter in front of it. Antennae light distad. Prosternum dusky testaceous or yellowish; prehensors yellow. Venter dilute yellow, caudal plates dusky yellow. Legs very pale, the caudal pairs more densely pigmented, bright yellow.

Body 9 to 10 times longer than width of the tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 48 : 48 : 49 : 54 : 54 : 52.5 (σ^7).

Head (in σ^7) slightly longer than wide (49 : 48). Weakly subsparsely punctate. Bristles moderately long, sparse.

Antennae short; articles twenty, short, subcylindric, uniform.

Ocelli ten to twelve in three series: *e.g.*, 1 + 3, 4, 3; 1 + 4, 3, 2; 1 + 4, 4, 3.

Prosternum 1.48 times wider than long. Distance between chitinous spots 2.7 times width at level of bottom of median sinus; 4.56 times the dental line. Teeth small, acute, with line of apices recurved. Spine moderately stout at base, bristle-like distally, straight.

First dorsal plate 1.7 times wider than long; sides gently convex, considerably converging caudad to and about the rounded caudal corners; widest just cephalad of middle. Caudal corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised.

Coxal pores small, circular: 2, 2, 2, 2; 2, 3, 3, 2.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the third to fifth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the sixth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the seventh and eighth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the ninth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 1, 1 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ or, less commonly, (σ^7), $\begin{smallmatrix} 1, 0, 2, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$. None of the coxae armed laterally.

Anal legs of male with the third joint elevated on dorsomesal side into a conspicuous, strongly chitinized ridge which is highest a little caudad of middle of its length, its edge rounding down evenly both ways; bearing two stout dorsal spines on caudal slope of ridge one behind the other, not in a transverse line at end of joint as in *clavigerens*. Fourth article crassate, longitudinally furrowed along dorso-

mesal surface, the furrow limited on mesal side by a low ridge which is elevated at proximal end into a more transverse conspicuous lobe, thin in a nearly cephalocaudad direction but wider transversely, concave on caudal side and projecting cephalomesad; third, fourth, and fifth joints longitudinally furrowed on ectal side toward dorsal surface (Plate 9, fig. 3).

Claw of female gonopods slightly curved; distinctly tripartite, with the median lobe much longest; the dorsal and ventral at about same level but the ventral smaller and more acute. Basal spines moderately long and slender; sides incurved between base and acuminate distal portion; a denticule at base of acuminate portion on each side with sometimes a second one farther toward apex.

Length 9–11 mm. A male 9 mm. long has antenna 3.25 mm. and anal leg 3— mm. long, with tenth plate 1 mm. wide.

TYPE LOCALITY.—M. C. Z. No. 276.—California: Laurel Canyon, Los Angeles Co., June, 1909.

Found also in California at Eaton's Canyon, April, 1913.

This species much resembles *P. clavigerens* but is clearly distinct from that species in spining of legs as well as in the form of lobes of anal legs and in other features.

POKABIUS UTAHENSIS (Chamberlin).

Plate 10, fig. 3, 4.

Lithobius utahensis Chamberlin, Proc. U. S. N. M., 1901, 24, p. 22 (nec Ann.

Ent. soc. Amer., 1909, 2, p. 187).

Lithobius obesus Bollman (nec Stuxberg), Proc. U. S. N. M., 1888, 11, p. 347.

Poabius utahensis Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 153.

DESCRIPTION.—Dorsum yellow, frequently of a dilute orange tinge. Head pale orange, commonly with the frontal region somewhat paler. Antennae like the head proximally, yellow distally. Prosternum and prehensors like the head. Venter pale yellow, darker, dilute orange, caudally. Legs pale, the posterior pairs more densely pigmented as usual, bright yellow or dilute orange.

Body in females on average shorter and relatively broader than in males, being mostly from 8 to 8.5 times longer than width of tenth plate in the former, and in male often near 9.5 times longer. Widths of head and of first, third, eighth, tenth, and twelfth plates in an average individual to each other as 23 : 20 : 21 : 24 : 24.5 : 23.

Head commonly slightly longer than wide (45 : 44). Caudal margin

straight or very weakly excurved. Head in front of eyes rather broadly rounded, subsemicircular. Smooth. Hairs moderately long, sparse.

Antennae very short, reaching fourth or beginning of fifth segment. Articles twenty or sometimes twenty-one or twenty-two; mostly very short, decreasing in size from the second to the ultimate.

Ocelli five to eleven, but mostly five to eight, in two longitudinal series: *e.g.*, 1 + 1, 3; 1 + 3, 3; 1 + 2, 2; 1 + 2, 3; 1 + 5, 2; 1 + 5, 3. Ocelli often irregular in form, size and arrangement and varying considerably in size in different individuals. Single ocellus of about same size as the larger ones in series.

Prosternum 1.5 times wider than long. Distance between chitinous spots 2.33 times width at level of bottom of sinus; 3.5 times the dental line. Median sinus moderately wide, v-shaped. Teeth small and pale or scarcely darkened. Spine moderately stout at base, bristle-like distally, nearly straight.

First dorsal plate about 1.66+ times wider than long; sides cephalad of the rounded corners nearly straight and also nearly parallel. Posterior angles of none of the plates produced. Plates smooth and shining.

Coxal pores small, with the most proximal one on each coxa often minute: 2, 2, 2, 2; 2, 3, 3, 2; 2, 3, 3, 3; 3, 3, 3, 3.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or sometimes $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second to seventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the eighth to eleventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 2, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or sometimes $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 2, 1, 1 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$ or, less commonly, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 2, 1, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 2, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claw one. Last pair of coxae laterally armed.

Anal legs of male with the third article typically produced at distal end mesad or dorsomesad into a conspicuous lobe which is thin in cephalocaudal direction and is contiguous with a corresponding lobe at proximal end of fourth joint which bears below apex a patch of short spinules projecting caudad; third joint typically with a wide longitudinal furrow on mesal or mesodorsal surface, this limited dorsally or ectally by a longitudinal, ridge-like, elevation; the two mesal spines of dorsal surface of third joint short, distally rounded, and finely serrulate, projecting cephalad from lobe; fourth joint longitudinally furrowed along dorsomesal surface, the furrow ending anteriorly at base of lobe previously mentioned, deepest cephalad; fourth joint more or less constricted or excavated just caudad of the lobe and then thickening caudad, swollen (Plate 10, fig. 3). The lobe formed by the extension of third and fourth joints at their con-

tigious ends subject to considerable variation in size. Penult legs of male slightly swollen but not otherwise specially modified. In the female the posterior legs are moderately slender.

Gonopods of male pale; moderately narrowed distad with apex rounded; bearing one moderately long bristle.

Claw of female gonopods short and relatively wide, rather strongly curved; claw tripartite, all lobes distinct, the middle one a little larger than the others. Spines $2 + 2$; rather robust, and typically more or less clavately widening from base to the acuminate apical portion, the outer side of which is the longer and is finely crenulate or serrulate (Plate 10, fig. 4). Inner side of first article straight or nearly so.

Length of females 7.5–9.5 mm.; of males 8.5–10.5 mm. A male 8.5 mm. long has antennae 2.4 mm. and anal leg 2.6 mm. long; width of tenth plate .896 mm.

Pseudomaturus.—Yellow, with less of orange tinge than in *maturus*.

Ocelli averaging in number toward lesser limit given for *maturus*.

Claw of female gonopods paler and smaller with lobes more slender and acute. Spines a little less robust with inner relatively a little shorter.

Length 6.5–7.5 mm.

Praematurus.—Coloration nearly as in older stages but lighter yellow with less of orange tinge.

Widths of head and of first, third, eighth, tenth, and twelfth as 33.5 : 30 : 31 : 36 : 38 : 37.

Antennae very short; full number of articles present.

Ocelli $1 + 1, 2$; $1 + 3, 2$. Single ocellus variable in relative size.

Prosternum nearly as in older stages. 1.6 times wider than long. Distance between chitinous spots 2.36 times width at sinus; 3.7 times dental line.

Coxal pores: 2, 2, 2, 2; 2, 2, 3, 2; 2, 3, 3, 2.

Female gonopods with joints short, especially the second and third. Claw small, thin and pale; the three teeth evident, though slender and acute. Third joint mostly with one short bristle; second with two or three; first with four or five. Spines $2 + 2$; the inner much shorter and more slender than the outer which is much as in *maturus* but smaller and often not at all clavately widened distad.

Gonopods of male small and wart-like; as yet glabrous.

Spines of first legs, $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 1 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 0, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$; of the third, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 0, 1, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$; of the fourth, $\begin{smallmatrix} 0, 0, 1, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$; of the fifth and sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$; of the seventh and eighth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 0, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$.

of the ninth to eleventh, $\frac{0, 0, 2, 2, 2}{0, 0, 1, 3, 2}$; of the twelfth, $\frac{1, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 2, 1, 1}{0, 0, 3, 3, 2}$ or $\frac{1, 0, 2, 1, 1}{0, 0, 2, 3, 2}$; of the penult, $\frac{1, 0, 2, 1, 1}{0, 1, 3, 3, 1}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$. Last pair of coxae laterally armed.

Anal leg of male modified as in *maturus* but lobe at junction of third and fourth joints somewhat less developed with the spinules on its caudal surface fewer.

Length 5.5–6.5 mm. A female 6.5 mm. long has tenth plate .73 mm. wide, thus being nine times longer than width of this plate.

Immaturus.—Dorsum very pale, whitish, the caudal plates tinged with yellow. Head dilute orange. Prosternum and prehensors like head. Venter whitish, caudal plates tinged with yellow. Legs and antennae whitish.

Antennae already with twenty articles but, especially the median and distal ones, considerably shorter than in the *præmaturus*.

Ocelli 1 + 2. The single ocellus smaller than the other two, the caudal one of which is largest. Pale.

Prosternum with teeth small and pale. Spines at base relatively to teeth somewhat stouter than in *maturus*, abruptly narrowed near middle to bristle-like form. In specimen measured only 1.45 times wider than long. Distance between chitinous spots 3 times width at sinus; 4.25 times dental line.

Coxal pores very small: 1, 2, 2, 2; 2, 2, 2, 2.

Gonopods of male small, whitish, glabrous.

Gonopods of female short and pale. Claw appearing as a small, acute pale point with no indication of lateral teeth or in earlier stages claw wholly absent. Third and second articles glabrous; the first with one or two bristles. Spines 1 + 1 or 1 + 2, small and acute, pale.

Spines of first legs, $\frac{0, 0, 0, 1, 1}{0, 0, 0, 0, 1}$; of the second to fourth, $\frac{0, 0, 0, 2, 1}{0, 0, 0, 0, 1, 1}$; of the fifth, $\frac{0, 0, 0, 2, 1}{0, 0, 0, 1, 1}$ or $\frac{0, 0, 0, 2, 2}{0, 0, 0, 1, 1}$; of sixth to tenth, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 1, 1}$; or in part, especially in the more anterior ones, $\frac{0, 0, 0, 2, 2}{0, 0, 0, 1, 1}$; of the eleventh, $\frac{0, 0, 1, 2, 2}{0, 0, 0, 1, 1}$; of the twelfth, $\frac{0, 0, 2, 1, 1}{0, 0, 1, 2, 1}$; of the thirteenth same as twelfth, or $\frac{1, 0, 2, 1, 1}{0, 0, 2, 2, 1}$; of the penult, $\frac{1, 0, 2, 1, 1}{0, 1, 3, 3, 1}$ or $\frac{1, 0, 2, 1, 1}{0, 1, 2, 2, 1}$; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 1, 0}$ or $\frac{1, 0, 2, 1, 0}{0, 1, 3, 1, 0}$. None of coxae as yet laterally armed.

Anal legs of male with fourth joint constricted, or excavated, near proximal end and the third and fourth joints more or less produced at junction into a lobe similar to, but usually less marked than, that in older stages, the spinules also present. Dorsal spines of third joint less modified.

Length of principal specimen described, 5.4 mm.

Agentialis II. Whitish, of faint yellowish tinge caudad. Head dilute orange or yellowish. Antennae and legs whitish.

Antennae composed of seventeen articles which, excepting the first few and the ultimate one, are very short. Bristles proportionately long and straight, not dense.

Ocelli 1 + 1 or 1 + 2. First ocellus in series largest.

Prosternum with teeth, sinus and spines as in *immaturus* or nearly so. 1.425 times wider than long, thus narrower than in *immaturus*, the proportionate width increasing with development throughout. Distance between chitinous spots $2.66+$ times width at level of bottom of median sinus; 3.42 times dental line.

Coxal pores minute: 1, 1, 1, 1.

Gonopods not yet exposed.

Spines of first legs, $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 0, 0, 0, 1 \end{smallmatrix}$; of the second to twelfth, $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 0, 0, 1, 1 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 0, 0, 1, 1, 1 \\ 0, 1, 1, 1, 1 \end{smallmatrix}$; of the anal, $\begin{smallmatrix} 0, 0, 1, 0, 0 \\ 0, 1, 2, 1, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 0, 0, 0 \\ 0, 1, 2, 1, 0 \end{smallmatrix}$. No lateral spine on any coxae.

Anal legs already nearly as in older stages but lobes weaker.

Length 3.5–4.5 mm.

TYPE LOCALITY.—Utah: Neff's Canyon, Salt Lake Co.!

Taken also in Utah in Mill Creek Canyon, City Creek Canyon, Farmington Canyon, Ogden Canyon, Cottonwood Canyon, American Fork Canyon, Provo Canyon; Spanish Fork Canyon, and other canyons of the Wahsatch Mts., where it is common under damp leaves along the streams.

POKABIUS SOKOVUS (Chamberlin).

Plate 11, fig. 2, 3.

Lithobius sokovus Chamberlin, Ann. Ent. soc. Amer., 1909, 2, p. 189.

Poobius sokovus Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 153.

DESCRIPTION.—Dorsum and venter very pale testaceous to whitish yellow. Head and antennae with prosternum and prehensors pale brown. Legs from whitish to pale yellow.

Body of type 8.8 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 23 : 22.5 : 23 : 25 : 25 : 24.

Head well rounded behind but the caudal margin straight. A little wider than long (23 : 22.5).

Antennae short, reaching the fifth segment as usual. Articles nineteen to twenty, short, with ultimate equalling the two preceding together.

Ocelli six to eight arranged in two series: *e.g.*, 1 + 3, 2; 1 + 4, 2; 1 + 4, 3. Single ocellus small, not much differing in size from caudal ocelli of series.

Prosternum 1.55 times wider than long. Distance between chitinous spots 2.9 times width at sinus, the anterior portion of prosternum being narrow with sides strongly converging; 4.37 times the dental line. Teeth very small and pale, the inner the larger and the line of apices thereby nearly straight. Median sinus rather small, v-shaped.

First dorsal plate with sides in front of the well-rounded caudal corners nearly parallel. Posterior angles of none of the plates produced.

Coxal pores small, circular: 1, 2, 2, 2; 2, 2, 2, 2.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 2, 1 \end{smallmatrix}$, of the second and third, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the fourth and fifth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 1 \end{smallmatrix}$; of the seventh to eleventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth and thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the penult $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 1, 3, 3, 2 \end{smallmatrix}$, claws two or an anterior accessory minute; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claw one. Last pair of coxae laterally armed.

Anal legs of male short and moderately inflated. Third joint elevated dorsally in a longitudinal ridge and at distal end in a transverse one much as in *utahensis*; fourth joint dorsally with a conspicuous longitudinal furrow which is widest and deepest proximally, the furrow being limited along the sides by a low ridge-like elevation and at the anterior end by the usual more conspicuously elevated lobe which extends dorsomesad and which is continuous on each side with the low longitudinal ridges, the lobe concave on its caudal surface, the concavity being a continuation of the dorsal furrow (Plate 11, fig. 2).

Claw of female gonopods tripartite. Spines moderately long and slender, with the sides subparallel or a little incurved between base and short, acuminate, distal portion (Plate 11, fig. 3).

Length 6.5–9 mm.

TYPE LOCALITY.—Nevada: Las Vegas (1909).

Dug up in loose soil in a garden. The female is not quite fully mature.

POKABIUS CLAVIGERENS Chamberlin.

Plate 9, fig. 1, 2.

Lithobius clavigerens Chamberlin, Proc. Acad. nat. sci. Phil., 1903, 55, p. 159.

Pomona coll. journ. ent., 1910, 2, p. 373 (in part).

Lithobius manni Chamberlin, Pomona coll. journ. ent., 1910, 2, p. 373 (*pseudomaturus* var.).

Poabius clavigerens Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 153.

DESCRIPTION.—Testaceous or light brown, or rarely of greyish cast suffused with violaceous (freshly moulted specimens) to darker brown with caudal plates commonly somewhat darker, chestnut or subferruginous; posterior borders of plates often darker and also in part with an interrupted longitudinal median stripe. Head mostly of a dilute ferruginous tinge, darker caudad of suture. Antennae similar to head, but typically pale proximally and at very tips. Prosternum usually much lighter than the head. Venter pale, the more caudal plates more deeply pigmented, yellow to somewhat ferruginous. Legs pale, the caudal pairs more deeply pigmented, brown, often lighter distally and along mesal surface where color may be yellow or some shade of orange.

Body moderately robust, being typically from 7.75 to 8.5 times longer than width of tenth plate, but sometimes only 7 times longer (var. *manni*). Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 44 : 41 : 43 : 53 : 54 : 51, the first plate being clearly narrower than the third.

Head from considerably wider than long, as in the type (44 : 41) to nearly equal in length and breadth or but slightly wider (only about 29.5 : 29 in var. *manni*). Cordate, considerably narrowed caudad of breaks and strongly so in front of eyes. The most distinct sulcus is the median longitudinal one in front of the suture which unites with a transverse one parallel with and a little in front of the suture. A short oblique sulcus, not very deeply impressed, each side of the middle just back of the suture the inner end of which is near a small, pit-like impression. The usual semicircular depression on caudal portion shallow and wide. Irregularly punctate.

Antennae short, the usual twenty articles short, decreasing distad; reaching to fifth or sixth segment.

Ocelli twelve to twenty-five but mostly sixteen to twenty-five (*clavigerens, forma typica*), arranged in three or four, or, more rarely, even in five or six, series: e.g., 1 + 5, 5, 3; 1 + 5, 5, 4, 2; 1 + 5, 5, 4, 1; 1 + 5, 5, 3, 2; 1 + 5, 5, 5, 2; 1 + 3, 5, 6, 3; 1 + 6, 5, 5, 1; 1 + 6, 6, 5, 1; 1 + 1, 5, 6, 6, 5, 1. Ocelli frequently well separated, not contiguous, regular in form and arrangement, decreasing cephalad, black. Single ocellus large.

Prosternum 1.53 to 1.58 times wider than long. Distance between chitinous spots 2.3+ to 2.55 times width at level of bottom of sinus; 4.2 to 4.4 times as long as the dental line. Sinus wide, strictly v-shaped (*manni*), or with sides concave and widely rounded at bottom (*forma typica*). Spines moderately stout at base but attenuated and

bristle-like distad, straight. Teeth small, the mesal one of each pair the larger so that line of apices is commonly almost straight.

First dorsal plate moderately narrowed caudad; about 1.85 times wider than long; sides, except at ends, nearly straight or but gently convex, moderately converging caudad. Dorsal plates mostly showing two short, deeply impressed, diverging, longitudinal lines at anterior end close to median line. Weakly roughened. Posterior corners of ninth, eleventh, and thirteenth dorsal plates mostly obliquely and somewhat concavely excised; others with corners less extensively excised or else subrectangular.

Ventral plates with each lateral longitudinal furrow on anterior portion ending abruptly in a deeper pit or bending directly ectad, especially so on the anterior plates. The median longitudinal sulcus represented on anterior plates mostly by a pit-like depression, but, more elongate on posterior plates. Last two plates of leg-bearing segments with corresponding coxae and also succeeding sternite subdensely pilose.

Coxal pores small, with the most proximal on each coxa often minute, with series sometimes irregular and even appearing double on some coxae: 3, 4, 4, 3, the most usual numbers and arrangement, to 4, 4, 4, 4 and 3, 4, 3 + 3, 3.

Spines of first legs, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second and third, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the fourth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 1, 1 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$ claws 3; of the anal, $\begin{smallmatrix} 1, 0, 2, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ (male), or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, sometimes $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$ (var. *manni*). Last two pairs of coxae laterally armed.

Anal and penult legs short and but moderately thickened in female. In the male the fourth joint has the usual ridge-like elevation along mesodorsal surface, this increasing in height proximad and terminating in a conspicuous flattened lobe lying oblique to the rest of the ridge, with the longitudinal furrow widest and deepest just caudad of this lobe; the rounded summit of lobe densely clothed with short, straight, fine hairs (Plate 9, fig. 1).

Claw of female gonopods moderate in size, only slightly curved; tripartite, with the lobes subacute, the middle one being but little longer than the inner or dorsal, the outer, or ventral, smallest. Spines moderately slender. Outer basal spine of each pair a little longer than the inner; in ventral view sides of spines subparallel from base to the acuminate apical portion or gently incurved between these limits; apical portion short and but moderately acute. Mesal side of first article straight and parallel with that of other gonopod or nearly so.

Length 11–16 mm. A female 15.5 mm. long has antennae 5.5 mm. and anal legs 5.25 mm. long, with tenth plate 1.97 mm. wide.

Pseudomaturus.—Coloration as in adult or but, on an average, a little paler.

Antennae same as in *maturus*.

Ocelli 1 + 5, 6, 3, 1; 1 + 5, 5, 4, 2; fourteen to eighteen in three or four series.

Claw of female gonopods a little smaller and paler but otherwise as in the *maturus*. Spines not differing but bristles somewhat fewer.

Coxal pores a little smaller relatively: 3, 4, 4, 3.

Length 9–11 mm.

TYPE LOCALITY.—California: Pacific Grove.

Taken also in California at Monterey, Carmel, and Stanford.

This is a very common species in the woods near Monterey and Pacific Grove where it is found under fallen logs and the bark of the same.

POKABIUS PITOPHILUS (Chamberlin).

Plate 9, fig. 4, 5.

Lithobius pitophilus, Proc. Acad. nat. sci. Phil., 1903, **55**, p. 157. Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 373.

Poabius pitophilus Chamberlin, Ann. Ent. soc. Amer., 1912, **5**, p. 153.

DESCRIPTION.—Brown to chestnut. Head somewhat darker with frontal region paler than region caudad of suture. Antennae chestnut, rufous at tips. Prosternum brown or pale chestnut, with the preensors lighter. Venter testaceous, the caudal plates darker as usual. Legs pale brown, the posterior pairs light distally.

Body in types 7.3–7.5 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 32 : 31 : 33 : 38 : 38 or 39 : 36.

Head considerably wider than long (8 : 7). Caudal margin widely and considerably incurved. Of about uniform width in region between breaks and eyes.

Antennae short, reaching fifth segment; articles twenty, short and approximately uniform.

Ocelli mostly twelve to twenty in four, or occasionally in three, longitudinal series: *e.g.*, 1 + 5, 4, 2; 1 + 3, 5, 3, 4; 1 + 4, 5, 5, 4; 1 + 4, 5, 4, 5; 1 + 5, 5, 5, 3. Single ocellus much largest. Other ocelli regular in form and arrangement, with the most ventral smallest as usual.

Prosternum typically about 1.48 times wider than long. Distance between chitinous spots 2.7 times width at level of bottom of median sinus; 4.4 times the dental line. Sinus widely v-shaped and rather shallow, its sides a little concave. Teeth small, the inner one on each side distinctly and considerably larger than the outer and the line of apices thus straight or sometimes even somewhat procurved. Spine small and slender.

First dorsal plate about 1.75 times wider than long; sides but moderately excurved and converging caudad. Posterior minor plates with caudal corners abruptly rounded, not excised.

Coxal pores small, circular: 3, 4, 4, 4; 4, 4, 5, 4; 4, 5, 5, 4; 4, 5, 5, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the second to ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth and thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$, claw one.

Anal legs of male short with the fourth joint moderately inflated. This joint dorsally with the usual conspicuous, longitudinal, ridge-like elevation which is much highest at beginning of middle third of length of article where it is produced dorsad or mesodorsad into a rounded lobe between which and the anterior end the ridge is lowest; at caudal end the ridge is produced into a small, subconic process which extends dorsocaudad. Penult legs rather slender, weakly longitudinally furrowed above.

Claw of female gonopods moderately long and curved; tripartite, with the lobes rather short and often blunt, or sometimes almost obliterated and leaving the claw subentire. Spines short and relatively wide, the sides somewhat diverging from base to acuminate apical portion which is short and, especially in the outer spine, obtusely angular with outer slope much more oblique than the inner and somewhat crenulate; inner spine inserted farther dorsad so that in ventral view it is often partly covered by the outer one. Mesal sides of first article of the two gonopods moderately diverging cephalad but not at all excavated.

Gonopods of male small, sides convex and strongly converging to the short, subtruncate, distal end which bears in an indentation a very stout bristle, a second and sometimes a third smaller bristle also present.

Length 10–13 mm. A male 10.25 mm. long has anal legs 3.5 mm. long and tenth plate 1.39 mm. wide.

TYPE LOCALITY.—California: Truckee (1902).

The types were taken in the pine woods about Truckee, where the species is common.

POKABIUS IGINUS (Chamberlin).

Plate 8, fig. 4; Plate 10, fig. 5.

Poobius iginus Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 154.

DESCRIPTION.—Dorsum brown, the posterior plates mostly darker than the others; in some the major plates have caudal borders darkened. Head brown of dilute ferruginous cast with typically a dark, smoky, or blackish, median area between frontal suture and caudal margin. Antennae similar to head proximally, becoming paler distad, the ends being yellowish. Prosternum and prehensors similar to head but lighter. Venter yellowish to dilute brown, the last few plates much darkest. Legs nearly like corresponding plates of venter or a little paler; the caudal pairs lightest distally as usual.

Typical full grown males average near 7 times longer than width of tenth plate but younger males and females are more slender, being as much as 8.4 times as long as the tenth plate. Widths of head and of first, third, eighth, tenth and twelfth plates to each other about as 39 : 39 : 41 : 45 : 45 : 43.5.

Head only slightly wider than long (39 : 38). Portion back of eyes subquadrate, the sides between eyes and lateral breaks nearly straight and parallel, from breaks rounding about corners caudad as usual. Caudal margin straight. A transverse sulcus in front of caudal margin which is united or continuous with two straight longitudinal sulci moderately diverging from it cephalad. Hairs short and sparse.

Antennae very short, reaching only to the fifth segment, attenuated distad in the usual degree. Articles twenty; sides of each article straight, but little diverging distad.

Ocelli twelve to fifteen in three, or sometimes in four, series: *e.g.*, 1 + 5, 5, 3, a common arrangement; 1 + 5, 4, 3; 1 + 5, 5, 3, 1. Single ocellus of moderate size. Ocelli of series small and nearly uniform, compact, black.

Prosternum 1.53 times wider than long. Distance between chitinous spots 2.85 times width at sinus; 4.6 times dental line. Sinus rather wide, sides a little concave. Teeth small; line of apices a little recurved. Spine short and slender, not bristle-like.

First plate 1.85 times wider than long; sides straight and only slightly converging caudad. Plates smooth or under lens appearing only slightly obscurely and finely roughened. Caudal margins of all plates straight, the caudal corners simply rounded or subrectangular.

Coxal pores very small or minute, circular: 2, 3, 4, 2; 2, 4, 3, 2; 2, 3, 3, 2; 3, 4, 4, 3.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 2, 1 \end{smallmatrix}$ to $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the second to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1(0), 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claw one. Last two pairs of coxae laterally armed.

In the anal legs of male the third joint, or prefemur, is strongly clavately thickened distad but is not extended mesad in a special lobe as in most related species, and the conical process is only obscurely, or not at all, indicated. The fourth joint bears a little caudad of its anterior end the usual conspicuous lobe extending in a meso-dorsal direction, but this is smaller than usual and its caudal slope is steeper and shorter, the usual ridge-like caudal extension of the elevation absent or but obscurely indicated but the process at the caudal end of the joint is well developed, subcylindric, bearing a few aculeate hairs, a small number of which also occur on the main lobe. Third, fourth, and fifth articles longitudinally sulcate dorsally, the sulcus of the fourth lying ectad of the process (Plate 8, fig. 4). Corresponding joints of the penult legs also similarly sulcate.

Claw of female gonopods very short and relatively broad, thin and nearly straight; tripartite, the lobes rather obtuse and distally more or less rounded, the median but little longer than the others. Basal spines short and stout, in surface view with sides parallel or a little diverging distad to the acutely pointed apical portion, broad surface of inner spine nearly at right angles with that of the outer one (Plate 10, fig. 5). Inner sides of first article of the two gonopods a little diverging from each other cephalad as usual.

Gonopods of male very short; distally bearing a bristle which arises from a slight indentation, no other bristles being observed in type.

Length of types 11–12 mm. A male 11.5 mm. long has antennae 5 mm. long and anal leg 4.5 mm. long, the tenth plate being 1.64 mm. wide.

Pseudomaturus.—Coloration as in *maturus* or a little paler.

Specimens studied considerably more slender than the typical adults, being near 8.5 times longer than width of tenth plate.

Antennae as in *maturus*.

Ocelli 1 + 4, 5, 3; 1 + 3, 4, 3; 1 + 3, 4, 2.

Coxal pores: 2, 3, 3, 2, minute.

Specimens of this stage studied cannot be separated on basis of length from the true *maturus*, being 10–11.5 mm. long.

TYPE LOCALITY.—Washington (E. Bergroth).

This species seems to be nearest to *P. pitophilus*, which it probably replaces in the north.

POKABIUS CARINIPES (Daday).

Lithobius carinipes Daday, Term. fügetek., 1889, **12**, p. 153, pl. 5, fig. 31.

Chamberlin, Pomona coll. journ. ent., 1910, **2**, p. 372.

The original description, somewhat rearranged, is as follows: —
Brunneo, medio dorsi fusco fasciato.

Corpore gracili.

Antennis sat longis, 22- articulatis, dense crinitis, in apice violaceis.

Oculis utrinque 15 in seriebus tribus positis.

Coxis pedum maxillarium 4-dentatis.

Laminis dorsalibus inermibus, sparsim ciliatis.

Poris coxalibus uniseriatis 2, 3, 4, 3.

Pedibus analibus [maris] sat crassis, articulo tertio quartoque supra sulcatis, articulo tertio sulco profundiore carinaque in apicem rotundata aculeataque instructo.

Ungue pedum analium simplici; calcaribus 0, 1, 3, 2, 0; articulo primo calcari laterali armato.

Longit. corp. 15 mm. Latit. corp. 2.5 mm.

Femina ignota.

LOCALITY.—Northern California: One male (Joanne Vadona).

The type is in the National Museum at Budapest. It will probably be found that the process referred to the third joint of the anal legs involves also a contiguous lobe at proximal end of the fourth and that the species is a true *Pokabius*.

LOPHOBIUS, subgen. nov.

POKABIUS SOCIUS Chamberlin.

Plate 12, fig. 2.

Lithobius socius Chamberlin, Proc. U. S. N. M., 1901, **24**, p. 23.

DESCRIPTION.—Dorsum yellowish brown to clear brown, sometimes with a paler median longitudinal line. Head of same shade as dorsum or darker brown, sometimes of dilute chestnut cast, frontal region somewhat paler. Antennae light brown, paler distally. Prosternum and prehensors dark brown or dilute chestnut. Venter yellowish brown, the posterior plates deeper brown. Legs light brown, the posterior pairs darker like the corresponding plates of venter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 80 : 73 : 74 : 85 : 85 : 84.

FIG. 9.—Distribution of *Lophobius*.

Head subcordate, considerably wider than long (8 : 7). Marginal breaks slight or scarcely evident. Caudal margin widely incurved.

Antennae short as usual, reaching fifth or sixth segment. Articles normally twenty, occasionally up to twenty-five; first seven to twelve moderately long, the others short.

Ocelli thirteen to twenty-two, mostly in four series, occasionally in three or five: *e.g.*, 1 + 5, 4, 3; 1 + 5, 4, 3, 1; 1 + 5, 4, 3, 2; 1 + 5, 5, 3, 2; 1 + 5, 5, 4, 3, 2. Single ocellus much the largest. Organ of Tömösvary well separated from the ocelli.

Prosternum proportionately very wide, being near 1.72 times wider than long. Distance between chitinous spots 2.1 times width at level of bottom of median sinus; 4.9+ times the dental line which is proportionately very short. Teeth small, normally 2 + 2, occasionally extra ones occurring. Margin extending from ectal tooth almost directly ectad for a considerable distance before abruptly bending back caudad. Sinus rather wide, somewhat v-shaped, narrowly rounded at bottom.

Sides of first dorsal plate convex at ends but nearly straight between, only weakly converging caudad. Posterior angles of the eleventh and thirteenth dorsal plates weakly produced; those of the ninth straight or somewhat excised.

Coxal pores moderate in size and circular or sometimes somewhat transversely oval: 3, 4, 4, 3; 4, 5, 5, 4; 5, 6, 6, 5.

Spines of first pair of legs, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$, less commonly $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the third to eighth, $\begin{smallmatrix} 0, 0, 3, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the ninth to tenth, $\begin{smallmatrix} 1(0), 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$, claws two, the accessory claw small.

Anal legs of male rather slender; the fourth joint a little clavate, with a distinct dorsal longitudinal furrow mesad of which the joint is commonly a little thickened or elevated in ridge-like form, this highest at caudal end but not truly lobate or cristate.

Claw of female gonopods short and broad, tripartite, with lobes acute or rarely with four or five more obtuse teeth or crenulations while, in the other direction, one of the three lobes normally present may be obsolescent. Spines broad, with sides more or less diverging from base to beginning of the acuminate portion (Plate 12, fig. 2).

Length 12–14 mm.; of anal legs 5–5.6 mm.

TYPE LOCALITY.—U. S. N. M. No. 784. Utah: near Salt Lake City.

Found also in Utah at various points in Salt Lake, Davis, and Utah counties.

Under stones in hollows and gulches over the foothills and in lower portions of canyons. Often in association with *P. collium*.

POKABIUS COLLIUM (Chamberlin).

Plate 11, fig. 4-6.

Lithobius collium Chamberlin, Proc. U. S. N. M., 1901, 24, p. 23.

Nadabius collium Chamberlin, Bull. M. C. Z., 1913, 57, p. 62.

DESCRIPTION.—Yellow to light brown, or, more commonly, with a decided tendency to ferruginous or orange; in some part of plates may be dusky. Head sometimes like dorsum but more typically a brighter lemon-yellow, or more reddish orange, or light ferruginous. Antennae mostly bright yellow or orange proximally.

Body in most, slender and 8.5-9 times longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 39 : 37 : 38 : 45 : 45 : 44.

Head wider than long in ratio (average) of 39 : 36.5. Sides only slightly excurved between eyes and marginal breaks, which are weak or obscure, and the diameter over this region nearly uniform. Caudal margin weakly widely incurved. A distinct transverse sulcus in front of median portion of caudal margining rim with two sublongitudinal sulci diverging cephalad from this. A median longitudinal sulcus as usual in front of suture.

Antennae short, reaching only to the fifth segment. Strongly attenuated distad, the tips being very slender. Articles normally twenty, sometimes up to twenty-three, short, decreasing distad.

Ocelli mostly fifteen to twenty-two in number; arranged mostly in four series: *e.g.*, 1 + 5, 5, 5, 3; 1 + 5, 5, 3, 1.

Prosternum 1.45 times wider than long. Distance between chitinous spots 2.64 times greater than width at level of bottom of median sinus and 5.38 times the dental line which is thus proportionately very short. Median sinus rather shallow and narrow, well rounded at the bottom. Spine small, slender and hair like. Teeth small; line of apices recurved; in some the teeth may be in part almost obsolete (Plate 11, fig. 4).

First dorsal plate 1.7— times wider than long; sides convex, converging caudad of anterior third. Caudal corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised. Smooth.

Coxal pores small, the most proximal one on each coxa often minute and the most distal one much largest: 2, 3, 3, 2; 3, 4, 4, 3; 3, 4, 4, 4.

Spines of first and second legs, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the third to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth and thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; the anterior accessory comparatively long; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, claw one. Last three pairs of coxae laterally armed.

Anal legs short; slender distad of the fourth article which is thickened; fourth article clavately widening distad, considerably thicker in dorsoventral direction than in lateral, dorsally with a conspicuous ridge-like elevation which, beginning even with the general surface at the proximal end, rises in height to the caudal end where it terminates as a somewhat rounded prominence or crest, which is toward the mesal side and projects dorsomesad, the ridge curving somewhat mesad of directly caudad in its course from anterior to posterior end, the joint longitudinally furrowed mesad of the ridge (Plate 11, fig. 6).

Gonopods of male small and rounded, wart-like, each bearing distally two long bristles.

Claw of female gonopods of moderate length, considerably curved; tripartite, the three lobes typically distinct with the median largest, but claw occasionally subentire. Spines moderately stout, the outer a little the larger; in view of broader surface the sides are subparallel or slightly divergent to the acutely acuminate apical portion (Plate 11, fig. 5).

Length 13–16 mm. A male 15 mm. long has antennae 5.5 mm. and anal leg about 4.7 mm. long with the tenth plate 1.64 mm. wide.

Pseudomaturus.—Coloration as in adult or a lighter yellow. Head, antennae, and posterior legs lemon-yellow.

Gonopods of female with claw nearly as in adult or a little thinner. Spines slightly more slender, with the inner one sometimes relatively somewhat smaller.

Dorsal spines of first legs mostly, 0, 0, 2, 2, 1. Ventral spines of twelfth and thirteenth legs more commonly 0, 0, 2, 3, 2.

Anal legs of male as in *maturus* but ridge and crest a little less pronounced.

Length 10–12 mm.

Pracmaturus.—Yellow, head and posterior plates brightest.

Ocelli 1 + 4, 3, 1; 1 + 4, 3, 2. Ocelli well separated, first of top series large.

Coxal pores: 2, 3, 3, 2, minute.

Claw of female gonopods with claw nearly same as in older stages. Third article with two bristles, second with three or four, and first with four to six. Spines 2 + 2, the inner much the smaller, close together, acutely acuminate from base.

Spines of first legs, $\frac{0, 0, 2, 2, 1}{0, 0, 1, 3, 1}$; of the second, $\frac{0, 0, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{0, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1}{0, 0, 2, 3, 2}$; of anal and penult as in adult.

Length of specimen described 9.25 mm.

Late immaturus.—Yellow with last plates and the head brightest. Antennae like head. Venter paler. Last pair of legs bright yellow.

Antennae with twenty articles which are short and closely compacted.

Ocelli 1 + 4, 3, small, well separated, the single ocellus smaller than first one of upper series.

Prosternum nearly as in adult. Line of apices of teeth more nearly straight. 1.48 times wider than long. Distance between chitinous spots three times width at level of sinus; 4.3 times the dental line. The anterior portion proportionately less wide than in adult and the dental line relatively longer.

Coxal pores minute: 2, 2, 2, 2.

Gonopods of female with a claw present, thin, small, acute and pale with lateral teeth already indicated. Spines 1 + 1, acute, attenuated from base to tip. Second article with two bristles, the first with three or four.

Spining as given for *praematurus*, which is early in that stage as the present is late in the *immaturus*.

Length 9 mm.; antennae 2.6 mm.; anal leg 2.9 mm.; width of tenth plate 1 mm. Widths of head and of the first, eighth, tenth and twelfth plates to each other as 47 : 43 : 46 : 55 : 55 : 53.

TYPE.—U. S. N. M. No 783. Utah: Salt Lake Co.

Found also in Utah in Salt Lake City, Farmington, Ogden, Provo, Lake Point, Antelope Island, Fremont Island, etc.

This species is very common in Utah under stones over the foothills during the damper months in spring and fall and in the lower parts of the canyons. It was found comparatively abundant under stones on the islands of the Great Salt Lake.

POKABIUS PUNGONIUS (Chamberlin).

Sozibius pungonius Chamberlin, Ann. Ent. soc. Amer., 1912, 5, p. 152.

DESCRIPTION.—Dorsum light testaceous, with the caudal plates and the head darker. Antennae yellow proximally and at tips, the remaining portion somewhat darker. Prosternum and caudal ventral plates yellowish, the remaining portion of venter a paler yellow. Posterior pairs of legs bright yellow.

Body of type 8.6— times longer than width of tenth plate. Widths

of head and of first, third, eighth, and tenth plates to each other as 33 : 30 : 35 : 35 : 34.

Head in type precisely equal in length and breadth. Caudal margin straight. Margination distinct and continuous cephalad to eyes, there being no distinct marginal breaks though there is evident the very oblique suture through the marginal rim. Hairs sparse and moderately long. Punctae irregular and weak.

Each antenna in type composed of twenty-one articles of which all but the most proximal and the ultimate are very short and closely united, decreasing distad. Antennae very short, reaching the fifth segment.

Ocelli twelve to fifteen in four series: *e.g.*, 1 + 2, 4, 4, 4; 1 + 3, 4, 3, 1. Ocelli small, black, irregular in form and size, with the series also irregular. Single ocellus small like the others.

Prosternum only 1.4 times wider than long. Distance between chitinous spots 2.65 times as great as width at level of bottom of sinus; 4.24 times length of dental line. Teeth small, black, narrowly rounded or subacute distally; in type 2 + 3; line of apices distinctly recurved. Sinus narrow, sides acutely converging. Spine slender and acute, close to outer tooth.

First dorsal plate 1.66+ times wider than long; sides rounded, conspicuously narrowed caudad of middle. None of plates with caudal angles produced. Posterior plates weakly finely roughened and punctate.

Coxal pores very small or minute: 3, 3, 3, 2.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the second to sixth, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the seventh, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eighth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth and thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, the claw one or accessory claw obsolescent; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 1 \end{smallmatrix}$, claw one. Last two pairs of coxae laterally armed.

Anal legs of male short and slender, not at all specially modified.

Gonopods of male pale, rounded, bearing two bristles.

Length 11 mm.; antennae and anal legs 4 mm.; width of tenth plate 1.28 mm.

TYPE LOCALITY.—Colorado: Marshall (T. D. A. Cockerell).

Only the male of this interesting species is known.

POKABIUS ARIZONAE, sp. nov.

DESCRIPTION.—Light orange-yellow with the head and the posterior plates a deeper orange, the frontal region of head palest. Antennae like head but lighter yellow distad. Prosternum and pre-

hensors light orange. Legs yellow, the posterior pairs more brightly pigmented, light orange.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 61 : 56 : 58 : 65 : 67 : 62.

Head in type slightly longer than wide (63 : 61). Rather strongly narrowed cephalad. Marginal breaks weak, oblique. Caudal margin weakly widely incurved.

Antennae short. Articles twenty-four; first four moderately long, the others decreasing gradually distad; ultimate shorter than the two preceding ones taken together.

Ocelli 1 + 4, 4, 2. Single ocellus largest though not greatly so.

Prosternum 1.55 times wider than long. Distance between chitinous spots 2.68 times width at level of sinus; 4.25 times dental line. Teeth apically narrowly rounded; distance between teeth of each pair about equal to that between the two mesal ones. Sinus broadly v-shaped, the sides straight. Spine clearly stouter than the bristles, straight, regularly acutely acuminate.

First dorsal plate widest a little cephalad of middle, not strongly narrowed caudad; 1.6 times wider than long. Posterior corners of the ninth, eleventh, and thirteenth dorsal plates obliquely excised.

Coxal pores small, widely separated: 2, 2, 3, 2.

Spines of first to fourth pairs of legs, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the fifth to eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three, with the accessory claws small but distinct.

Anal legs of male slender, not modified.

Gonopods of male well exposed; bearing two bristles.

Length 12 mm.

TYPE.—M. C. Z., No. 285, Arizona: Tucson (W. M. Wheeler).

This species is known from a single male. It is aberrant.

POKABIUS HELENÆ, sp. nov.

Plate 12, fig. 3.

DESCRIPTION.—Dorsum yellowish brown to clear brown, with sometimes part of the plates dusky. Head mostly more or less ferruginous with frontal region a little paler. Prosternum and prehensors testaceous of a dilute ferruginous tinge. Venter yellow to yellowish brown, with caudal plates ferruginous. Legs like corresponding plates of venter.

Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 76 : 72 : 74 : 85 : 86 : 84.

Head widest immediately caudad of eyes, a little wider than long. Caudal margin mesally incurved. Marginal breaks slight.

Antennae short and slender, usually reaching to the fifth segment. Articles normally twenty, moderate, sometimes the first seven to ten markedly and abruptly longer than those succeeding. Ultimate article longer than the two preceding together.

Ocelli fifteen to eighteen in three or more frequently in four series: *e.g.*, 1 + 5, 5, 4; 1 + 5, 4, 4, 3; 1 + 5, 5, 3, 2; 1 + 5, 5, 4, 2; 1 + 5, 6, 5, 1; 1 + 6, 5, 4, 2. Single ocellus clearly largest, elliptic. Organ of Tömösvary relatively small.

Prosternum 1.65 times wider than long. Distance between chitinous spots 2.5 times width at level of sinus; 4.33+ times the dental line. Sides of anterior portion convex and rounding out considerably laterad. Teeth very small, narrow at base, distally rounded. Sinus strictly v-shaped. Spines slender, distally bristle-like, straight or nearly so.

First dorsal plate a little widest anteriorly; sides substraight and not strongly converging caudad to the rounded posterior corners; in type near 1.9 times wider than long. Posterior corners of the thirteenth plate weakly produced, those of the ninth and eleventh typically, somewhat concavely, excised.

Coxal pores: 3, 4, 4, 3; 4, 4, 4, 4; 4, 5, 5, 3; 4, 5, 5, 4; etc.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the third to ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 1, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth and penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$ claw one. Last two pairs of coxa laterally armed or spine of penult coxae sometimes absent.

Anal legs of male rather slender; the fourth joint a little crassate, a little incurved or depressed above and weakly elevated at distal end.

Claw of female gonopods short, tripartite, the lobes all acute and distinct, the median longest though not greatly so. Spines moderately long and of moderate proportionate breadth, sometimes appearing bent mesad near middle of length, the sides typically subparallel from base to apical portion.

Length 9–13 mm.

TYPE.—M. C. Z., No. 185. Montana: Helena (W. M. Mann).

POKABIUS CASTELLOPES (Chamberlin).

Plate 12, fig. 1.

Lithobius castellopes Chamberlin, Proc. Acad. nat. sci. Phil., 1903, 55, p. 158.
 Pomona coll. journ. ent., 1910, 2, p. 373.

DESCRIPTION.—Dorsum testaceous; head but little paler. Antennae light; paler distad than proximad. Legs yellowish, the caudal pairs more deeply pigmented and brown proximad, yellowish distad.

Body in type 7 times, or a little less, longer than width of tenth plate. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 28 : 26 : 27.5 : 32 : 35 : 33.

Head a little longer than wide (30 : 28.5). Cordate. Caudal margin mesally incurved. Head considerably narrowed cephalad. Sparsely clothed with rather long hairs. Smooth. Marginal breaks distinct.

Antennae short; slender distad. Articles short and very short, decreasing distad as usual.

Ocelli twelve in three series: 1 + 5, 4, 2. Patch elongate. Ocelli separated, not contiguous, those of top series considerably largest.

Prosternum 1.4 times wider than long. Distance between chitinous spots 2.38 times greater than width at level of bottom of median sinus; 3.58 times the dental line. Median sinus strictly v-shaped, with sides straight. Teeth small and pale; line of apices recurved.

First dorsal plate 1.8 times wider than long, widest anteriorly and considerably narrowed caudad. Caudal minor plates with posterior corners obliquely excised, but line of excision short. Smooth.

Coxal pores very small: 2, 3, 3, 2.

Spines of first to third pairs of legs, $\frac{0, 0, 2, 2, 2, 2}{0, 0, 2, 3, 2}$; of the fourth to eleventh, $\frac{0, 0, 3, 2, 2, 2}{0, 0, 2, 3, 2}$; of the twelfth, $\frac{1, 0, 3, 2, 2, 2}{0, 0, 3, 3, 2}$; of the thirteenth, $\frac{1, 0, 3, 1, 1, 1}{0, 0, 3, 3, 2}$; of the penult, $\frac{1, 0, 3, 1, 1, 1}{0, 1, 3, 3, 1}$, claws three; of the anal, $\frac{1, 0, 3, 1, 0}{0, 1, 3, 2, 0}$, claw one. Last two pairs of coxae laterally armed.

Anal and penult legs in the male considerably swollen. Anal legs short; fourth joint thick, somewhat bowed ventrad with dorsal surface concave, saddle-like and at distal end elevated into a conspicuous lobe which narrows to an edge dorsad and is truncate caudad on level with end of joint or distally a little extending beyond it; lobe on caudal surface near apex bearing a caudally directed spine; dorsal surface of joint cephalad of the lobe longitudinally sulcate (Plate 12, fig. 1).

Gonopods of male well exposed; distally truncate; sides subparallel.

Length of type (σ^7) 8.8 mm.; antennae and anal legs 3 mm.; tenth plate cir. 1.28 mm. wide.

TYPE LOCALITY.—California: Shasta Springs (1902).

POKABIUS EREMUS, sp. nov.

DESCRIPTION.—Brown, with the head darkest. Antennae light brown. Venter light brown. Legs pale, posterior pairs darker, light distally.

Body moderately narrowed cephalad from the tenth plate with the first dorsal plate slightly narrower than the third and much narrower than the head. Widths of head and of first, third, eighth, tenth, and twelfth plates to each other as 57 : 50 : 51 : 62 : 64 : 64.

Head slightly wider than long (57 : 56 or 55). Widest a little caudad of eyes from where narrowing regularly to the caudal corners, a little indented or incurved at level of suture where the marginal break would be if present. Caudal margin straight. Conspicuously narrowed cephalad.

Antennae of intermediate length, reaching to sixth segment. Articles twenty to twenty-one, of intermediate length to rather long, subcylindric, each only slightly widening distad, of nearly uniform proportions; ultimate shorter than the two preceding ones taken together.

Ocelli in type twelve in three series: 1 + 5, 4, 2. Those of the upper series large, regular, deeply pigmented. Single ocellus not larger than the caudal ones of series, or but little so, and not otherwise sharply differentiated. Ocelli of most ventral series considerably smaller and paler than the others in the type.

Prosternum in type 1.425 times wider than long. Distance between chitinous spots 2.8 times width at level of bottom of median incision; 4.5 times length of dental line, the anterior portion of the prosternum being especially narrow at its cephalic end and the dental line correspondingly short. Median incision large; sides concave; narrowly rounded at bottom; wide, the distance between inner teeth being greater than that between the teeth of each pair. Spine rather stout at base; long and slenderly acuminate; inserted a considerable distance caudad of level of teeth. Margin sloping directly ectocaudad from base of outer tooth.

First dorsal plate with sides only weakly convex, regularly and only moderately converging caudad; in type *cir.* 1.78 times wider than long. Posterior corners of ninth, eleventh, and thirteenth dorsal plates obliquely excised (the right corner of ninth plate in type is not thus excised) but the caudal margin is a little angularly extended caudad just mesad of inner end of the excision.

Coxal pores small, especially so the proximal ones: 4, 4, 4, 5.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 1 \end{smallmatrix}$; of the second to seventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the eighth and ninth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 3, 1, 2 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three, the anterior accessory being long and slender; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 2, 0 \end{smallmatrix}$, the claw single. Last two pairs of coxae laterally armed.

Claw of female gonopods long and rather slender, strongly curved; tripartite, with the lobes all acute and the median not greatly exceeding the lateral ones. In ventral view the outer basal spine is narrowest near the middle, the sides incurving; the acuminate apical portion is very short, with one or both edges denticulate and the tip truncate. The outer spine is larger than the inner one which appears acuminate from very base and is distally acute.

Length of type (♀), 8.5 mm.

TYPE.—M. C. Z., No. 187. British Columbia: Kaslo.

The spining of the legs of this species at once differentiates it from the others at present known. It is the only one in which the tibia of the anterior legs bears two dorsal spines, and in which the tibia of the penult leg is armed dorsally.

SIMOBIUS gen. nov.

Marginal interruptions of head slight and oblique or sometimes scarcely manifest.

Antennae short; composed in type species of twenty-one or twenty-two articles.

Eyes composed of seriate ocelli; single ocellus distinctly differentiated, large.

Prosternal teeth 2 + 2; line of apices recurved. Spines slender, bristle-like.

Posterior corners of 11th and 13th plates (in type-species) weakly produced.

Coxal pores small, circular; uniseriate.

Claw of female gonopods tripartite, the median tooth not much

FIG. 10.— Distribution of *Simobius*.

exceeding the lateral ones. Spines $2 + 2$, of intermediate length and breadth. First article of gonopods not excavated proximally.

Tarsi of anterior legs divided.

Anal legs of male short and moderately inflated; without special processes or modifications. Penult legs in male with fifth article bearing at the distal end on the dorsal surface a conspicuous process.

Last two pairs of coxae laterally armed. Third joint of all legs caudad of the second pair normally with three spines. Fifth joint of all legs between first or second and twelfth with two dorsal spines. In type species, dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 3, 1; claw single. Dorsal spines of penult legs 1, 0, 3, 1, 0; ventral 0, 1, 3, 3, 2; claws three. Dorsal spines of twelfth legs 1, 0, 3, 1, 2; ventral 0, 0, 3, 3, 2.

Length 11 mm. and over.

TYPE.—*S. ginampus* (Chamberlin).

The type species is the only one thus far known. In the character of the modification of the penult leg in the male, the genus suggests *Guambius* but is very readily distinguished from that genus in other characters.

SIMOBIUS GINAMPUS (Chamberlin).

Plate 12, fig. 4, 5.

Lithobius ginampus Chamberlin, Ann. Ent. soc. Amer., 1911, 1909, 2, p. 187.

DESCRIPTION.—Dorsum yellowish brown or testaceous to dark smoky brown, or somewhat mahogany-brown, when in full color showing a longitudinal darker stripe on all or most of the major plates. Head from light chestnut, in paler specimens, to mahogany or almost black in the darker ones. Antennae light brown to chestnut proximally, paler distally. Prosternum from light brown to dark smoky brown; prehensors lighter, rufous, distad. Venter yellowish to brown, the last several plates darker. Legs yellowish to brown, nearly uniform.

Body proportionately wide, being commonly only 7, or less, times longer than width of the tenth plate. Body considerably narrowed cephalad with the first plate narrower than the head and than the third, the latter being but little narrower than the head. Widths of head and of first, third, eighth, and tenth plates to each other as 48 : 45 : 47 : 55 : 50.

Head wider than long in about the ratio 48 : 45. Rather strongly

narrowed cephalad from caudal edge of eyes. Immediately in front of the suture is a median depression and a little in front of this a dot-like second impression; immediately caudad of the suture is a dot-like impression each side of the median line and a second similar pair farther caudad; the usual semicircular impression just in front of the caudal margin. Head otherwise nearly smooth, shining.

Antennae very short; reaching fifth or sixth segment. Articles twenty-one or twenty-two, short and subcylindric; ultimate rather long.

Ocelli of each eye mostly ten or twelve in three series: *e.g.*, 1 + 4, 3, 2; 1 + 4, 4, 2; 1 + 4, 4, 3. Single ocellus large, ovate; of the other ocelli, the most caudal of the dorsal series are largest, the others decreasing cephalad and ventrad.

First dorsal plate near 1.8 times wider than long. Most major plates showing a pair of furrows diverging from the anterior end caudad and the usual short, transverse, submarginal sulcus on each side near beginning of caudal third of length. Moderately roughened, the caudal plates more distinctly so. Posterior angles of ninth plate with caudal edge straight or a little bent cephalad; those of eleventh and thirteenth a little produced caudad.

Ventral plates with the usual three longitudinal sulci. A submedian transverse impression which is most distinct on plates toward caudal end.

Coxal pores small, decreasing proximad: 3, 4, 4, 3; 3, 4, 5, 3; 4, 5, 4, 3; 4, 5, 5, 4; etc.

Spines of first legs, $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 2, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the second, $\begin{smallmatrix} 0, 0, 2, 2, 2 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$ or $\begin{smallmatrix} 0, 0, 2, 2, 1 \\ 0, 0, 1, 3, 2 \end{smallmatrix}$; of the third to tenth, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 2, 3, 2 \end{smallmatrix}$; of the eleventh, $\begin{smallmatrix} 0, 0, 3, 2, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the twelfth, $\begin{smallmatrix} 1, 0, 3, 1, 2 \\ 0, 0, 3, 3, 2 \end{smallmatrix}$; of the thirteenth, $\begin{smallmatrix} 1, 0, 3, 1, 1 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$; of the penult, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 2 \end{smallmatrix}$, claws three; of the anal, $\begin{smallmatrix} 1, 0, 3, 1, 0 \\ 0, 1, 3, 3, 1 \end{smallmatrix}$, claw one. Last two pairs of coxae laterally armed.

Anal and penult legs of male short and moderately inflated with the tibial joints abruptly more slender. Anal legs without special lobes. Penult legs with the fifth article having dorsocaudal corner of distal end obliquely excised as in *Arenobius*, etc., and bearing upon the oblique surface a conspicuous subcylindric but laterally compressed, process which is sublongitudinal in position and is as high, or nearly as high, at proximal as at distal end; free surface of lobe obliquely truncate, bearing but few bristles (Plate 12, fig. 4).

Gonopods of male well exposed, with sides convex and the distal edge oblique and nearly straight, the ectal side being shorter than the mesal; bearing two bristles.

Claw of female gonopods tripartite, the lobes or teeth short and

usually rather blunt, the median being longest though not greatly so. Outer spine longer than the inner; a little acuminate from base distad with the sides more or less incurved near the middle; apical portion short, narrowly rounded at tip (Plate **12**, fig. 5).

Length of types 11 to 14 mm. A male 13.5 mm. long has antennae 5 mm. long, anal legs 4 mm. long, and the tenth plate 2 mm. wide.

TYPE LOCALITY.—Washington: Pullman (W. M. Mann).

Found also in Alaska on Forrester Island (Harold and R. W. Heath).